Better Crops

The Pocket Book of Agriculture.

April 1927 10 Cents

This month: Attention, Please! — Asparagus — Better Grains and Hays — Potash Pays — Florida

Education or Catastrophe?

OUR present day civilization, according to H. G. Wells in his *Outline of History,* is engaged in a race between education and catastrophe. Either we must learn how to use rightly the knowledge and inventions which science is making available to us or our civilization will go to the wall.

This seems especially true of agriculture where the need for education and leadership is greater than in any other industry.

It was in recognition of this need that the Smith-Lever Act was passed more than 10 years ago. By establishing a nation-wide county agent service it sought to put into practical use the supply of information developed by the experiment stations.

The splendid achievements of these research and extension agencies should not, however, blind us to the size of the jobs still to be undertaken.

The great problems of soil fertility, for example, have barely been scratched. If we are to produce sufficient food and staples for a constantly growing population and produce them efficiently and profitably, every agency concerned with crop production must cooperate to the fullest extent.

It is our policy to base our educational and advertising program on a complete view of all the truth, to develop it in accord with the soil fertility programs of the various extension agencies, and to cooperate in every way possible with county agents, vocational teachers, and extension workers in getting practical and tangible results.

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POTASH

Better Crops

The Pocket Book of Agriculture

The Whole Truth—Not Selected Truth

VOLUME VIII NUMBER TWO

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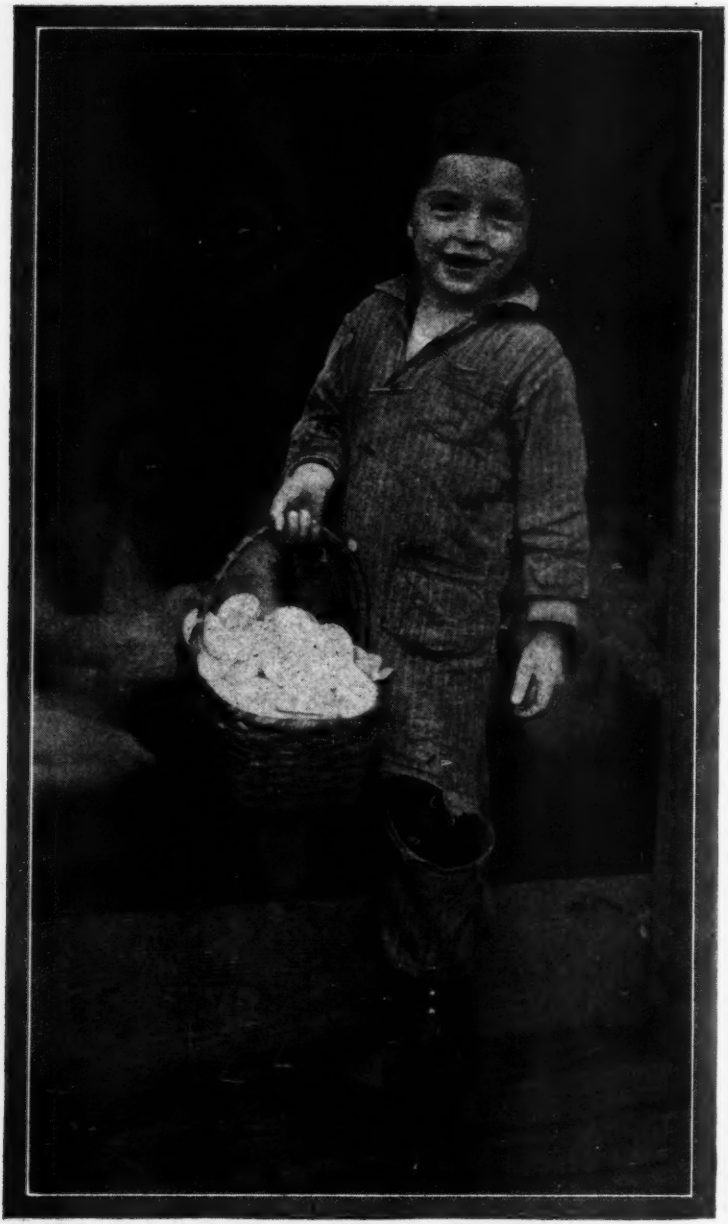

Fresh Eggs for Easter

Better Crops

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VOL. VIII NEW YORK, APRIL, 1927 No. 2

¶ *Some light on limelight.*

ATTENTION, Please!

By Jeff McDermid

BANG! Bang! Bang!

Now the two figures that had been struggling in breathless silence on the edge of the cliff were seen to separate. A woman's voice rang out of the still, black shadows. "Look out! They're coming!" she cried.

But, before we go any farther, I had better confess that this is not the beginning of a tale of murder and mystery. It is intended merely as an illustration of one of the many ways in which it is possible to secure attention and arouse interest.

Have you ever stopped to inquire why you unhesitatingly pay attention to certain writers or speakers while all the inducements in the world could not persuade you to follow others? Why does one speaker electrify us and another put us to sleep? Why do we always seek out the articles by one writer and skip over some other man's contribution?

Many people would say that their preference is due to the subject matter. They will listen to X because he is talking about radios—a subject close to their hearts—and they do not listen to Y because he is discoursing on "The Function of the Pineal Gland in Mammals"—a subject in which they have no interest whatever.

The subject may make some

difference but I insist that the real essential is not the subject but the way it is presented. Equipped with a little training in some of the simpler laws of psychology, a speaker can make any subject interesting and conversely, by ignoring these laws, he can be dull and boresome on any subject.

Take insects, for example. I never had the slightest interest in insects, except to keep as far away from them as possible. I couldn't tell a pear leaf beetle (serica tricolor) from a plum leaf beetle (nodonota tristis) and I had no desire to learn.

Yet, several years ago when a book by J. H. Fabre on beetles fell into my hands, I devoured it with avid interest and was sorry when it ended. For Fabre, great observer and scientist though he was, had learned how to make his subject interesting even for people like myself who don't like "bugs."

Fabre has done the same thing with spiders, wasps, and other insects, and if you would like an answer to the question, "How can scientific data be made interesting to the average person?" you should speedily read some of his fascinating works.

THERE is, I believe, a general impression among those engaged in scientific and educational work that it is more or less necessary to be a little dull in presenting their subject. Too much interest might mean a loss of dignity. "Oh, he's just a circus performer," I have heard teachers say of a colleague who was unusually successful in interesting his students.

As a matter of fact, I have always cherished a deep admiration for the unerring instinct with which circuses, medicine shows, and the like capture and hold the interest of their audiences.

It is a mistake to confuse the fake cures and remedies a medicine showman sells with his ability to sell them. Throw his medicines in the sink but store his selling psychology under your hat.

LET us take a mental trip to an old-fashioned medicine show and see what we can learn there about the technique of attracting attention and holding interest.

On a vacant lot near the center of town stands a crude stage, brilliantly lighted and decorated with gaudy banners and trappings. On the stage is a moving figure. Grouped in front is a crowd, a big crowd for a town of this size.

Already we see illustrated three different ways of attracting attention. First, contrast — the brightly lighted and colorful stage against the black night; second, movement—the dancer on the stage; and third, curiosity — the desire to see why other people have collected there.

Like the others who are flocking to the scene, we respond to these appeals and join the crowd in front of the stage. The dancer, we find, is a woman engaged in demonstrating the Charleston—not very well, to be sure, but well enough to hold our attention. She is followed by a negro entertainer who sings, dances, and tells some funny stories and he, in turn, by other acts. Considering that no admission is demanded, it is pretty good entertainment and the crowd seems to be in an appreciative frame of mind.

Now comes the main event of the evening. A table covered with mysteriously veiled objects is brought on, and the "doctor" makes his bow. He is carefully, if somewhat gaudily, dressed and he begins at once in a smooth, con-

(Turn to page 62)

Sold: A Plan of Soil Improvement

A. W. Klemme, County Agent, Lawrence County, Mo.

By

H. W. Warner
Editorial Agronomist, The National Fertilizer Association, Washington, D. C.

IT has taken only five or six years to secure fairly complete accord on the merits of the present-day problem in agriculture, except as to how or whether it will be solved; and it has taken that many years plus 300 of American farm history and experience to secure equally full agreement on the merits of the all-time problem in agriculture. I refer to the problem of maintaining soil productivity.

The farmer, through economic necessity, and all of us, through a common interest in having something to eat today and every day, can present a well-nigh united battle front, offensive and defensive, against the one-time spectre of waning soil fertility. Fortunately, however, the second quarter of the twentieth century finds us so fortified by nature and guarded by science as to insure against extinction of our national and earthly existence through failure of the soil to produce food.

Now, what has this to do with the subject at hand? Simply this: the harnessing of one and the application of the other of these two forces—nature and science—in the great practical problem of maintaining or increasing soil fertility constitutes what we know as a "program of soil improvement."

History chronicles the theories and practices relating to soil fertility of one century, 10 centuries, and 40 centuries ago, but not the name of the author, nor the scheme, of the first modern, practical, and scientific program of soil improvement. It does, however,

record the most recent one and it is this down-to-the-minute, tried and proven program of soil improvement, and others like it, that show the way in organizing the advance toward more efficient production as a means to the greater end—higher standards of rural life.

STRANGE as it may seem the particular plan in question emanates from the Ozarks, that long picturesque classic of a hopeless agriculture—land of gullied slopes and mud-paved trails, of shoeless feet and clay pipes, of rangy critters and mangy houn' dogs, as a stranger might describe it. Nor is it so strange, either, for there one finds the fertility problem in its most aggravated form, there the opportunity and the need for improvement, and there the many obstacles, human and otherwise, necessary to give strength and resourcefulness to the planners and their plan.

This program, "A Soil Improvement Plan for Lawrence County, Missouri," has been developed by the farm people of that county under the direction and leadership of county agent A. W. Klemme, the Missouri College of Agriculture, and leading farmers and business men of the county. There may be equally good programs of soil improvement in some of the hundreds of agricultural counties. If so, they were not among the more than 20 entries to reach the final stage and survive the critical examination and careful scoring made by the judging committee which placed the Missouri program at the top of the 1926 "County Program of Soil Improvement" contest conducted by the Soil Improvement Committee of the National Fertilizer Association.

IN judging the contest, the committee composed of Director J. G. Lipman, of the New Jersey Agricultural Experiment Station; Dr. W. H. Stevenson, head of Crops and Soils, Iowa State College; Professor A. B. Beaumont, head of Agronomy, Massachusetts Agricultural College; Dr. M. M. McCool, head of Soils at Michigan State Agricultural College; and O. S. Fisher, Extension Agronomist, U. S. D. A., scored the entries and based their decision upon four con-

The speakers and the truck furnished by the Missouri Extension Service. By these means the college of agriculture was literally taken to the farms of the county

The winners in the National Contest. From left to right: R. K. Clapp, New Haven county, Connecticut; Thomas H. Blow, Washington county, Vermont; A. M. Hedge, Vinton county, Ohio; W. B. Posey, Prince Georges county, Maryland; E. K. Walrath, Carroll county, Maryland; A. H. Pickford, Story county, Iowa; Roscoe R. Fraser, White county, Indiana; A. W. Klemme, Lawrence county, Missouri

siderations. These were: analysis of the problem, methods employed, results secured and the application of the program to the agriculture of the county.

The old familiar reasons for soil improvement—"debt to posterity," "duty to the soil," "as good as we got it," "permanent fertility"—find no mention in this program. Instead, Klemme kicks off, so to speak, with his more modern reasons for a soil improvement program, as follows:

"The soil problem of Lawrence county, Missouri, arises from the necessity of growing concrete highways, modern homes, and motor cars out of the same soil that produced, in its virgin state, only the cabin, the road through the clearing, and the old spring wagon. On soil depleted by 60 years of continuous cropping, the Lawrence county farmer of today must pay 10 times as much tax as his grandfather paid, and he must spend 10 times as much for comforts and education."

WITH such an avowed purpose it takes no great stretch of the imagination to understand why the farmers of the county—a typical Ozark region—went in for such an undertaking. They were shown desirable—and tangible—objectives to be gained (and may it be said that therein lies about 90 per cent of the requirements for getting action in agricultural advancement, as elsewhere). Klemme not only made his proposition sound right to his "Show Me" people but he must have completely sold himself and his co-promoters, for there is infinitely more satisfaction—kick, thrill, throb, or what have you—in working for better homes,

roads, schools and the rest than in working for "permanent fertility" or "posterity," and I believe this holds just as true for the man who practices soil improvement as for the man who, like the county agent, only promotes it.

The analysis of the fertility problem in this county seems exceptionally good. Nature, through her sloping of the land and her apportionment of plant food to the soil, had already decided that livestock farming, preferably dairying, was the type for which the land of the county was best adapted. Klemme concurred. But in doing so he didn't reverse the relative position of horse and cart by holding out the false hope that the dairy cow, soil fertility, and good crops would come to the county in exactly that order. On the contrary he pointed out that dairying, for which the land was best suited, would succeed only when there was provided fertility enough to grow the crops on which a profitable dairy farming could be built.

The marching order in the parade therefore became: soil fertility, first; the right crops, second; and properly fed cows, third. Simple enough, when you think about it! But how many farms and farming communities are trying to do bootstrap-lifting by depending on livestock to manufacture increased soil fertility out of the limited crops a depleted soil will produce?

Klemme studied the Missouri State statistician's figures for his county and found that only 1.4 per cent of the crop land was in legumes; that 16.2 per cent was in corn; and 19 per cent in wheat. He learned, too, that wheat yields for the past 10 years had been only 11 bushels and that corn yields for the past 20 years had been only 22 bushels. Here were some real problems that must be considered in the analysis! And all were directly traceable to lack of systematic rotation, depleted plant food, low lime content, and lack of humus.

With about 35 per cent of the land too rough or stony to cultivate, with mild winters and a nine-months pasture season, with good water and trees for shade the area had everything needed for a dairy type of farming—everything, except something for the cows to eat. And to provide this much needed cow feed was the big job of the Lawrence county soil improvement program.

ALMOST everything in the category of soil problems existed—and prevailed—in the county. Acid soils, low organic matter supply, shortage of plant foods, lack of rotation, poor handling of manures, and soil erosion, all in varying shades and degrees were found on every hand. These problems were taken into account in formulating the plan of soil improvement adopted and recognition given the following essential principles:

I. Improvement of pastures.
II. Conservation and reinforcing of manures.
III. Use of high grade commercial fertilizers on general farm crops and special fertilizer on fruit and truck crops.
IV. Return to the land of all crop refuse and plowing down green manures for special crops.
V. Liming acid soils.
VI. Adapt system of farming to the soil with a rotation which includes a suitable legume crop.
VII. Control of soil erosion.

A single reading will convince one that the program outlined was ambitious, but not extravagant in

(*Turn to page 42*)

Unbending Backs in Farming

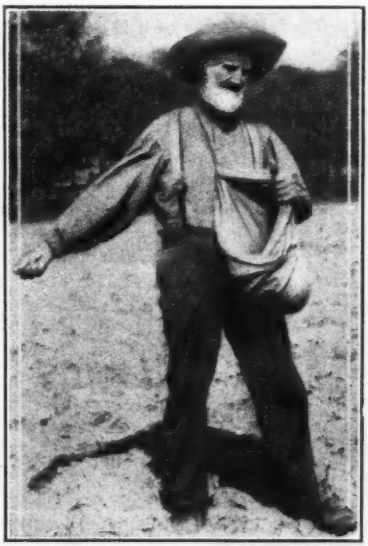
By M. L. Hopkins
Madison, Wisconsin

¶ *No. 7 of these historical stories.*

MAN and beast, despite all modern developments of food and feed, still depend, for their life and well-being, upon seed time and harvest.

Despite the necessary shifting of the food surplus and food deficit districts of the world, sowing and reaping are going on in one part or another of the earth all months of the year. So from a world point of view, these operations are continuous and unending.

The world over springtime is seed time. All that has changed and that is different is the process and here the inventive genius of man is largely responsible for the difference. Of course, Dame Nature had had her say on what shall be man's choice of foodstuffs. Here she permits a wide range of selection, including many or all of the cereals, there she restricts the choosing to the more hardy. But similar as are the crops, the processes of seeding and garnering differ widely, ranging from hand sowing to power seeding.



"As ye sow, so shall ye reap"

The first seeding, undoubtedly, was done by primitive man; his method consisted of first planting the seeds, by means of stags' horns or crooked sticks which made holes in the ground, then covering them.

Early in the history of England, the wheat was scattered into the plow furrow, often by a small child, who carried a bag filled with grain in front of the horses or oxen drawing the plow. The same method prevails today in East Central India, with the exception that

a woman takes the place of a child.

The scattering of seed by hand or broadcast sowing is the oldest method of delivering seed to the earth, the seed being sown on the surface. The Egyptians of 3000 B.C., sowed by hand; that method is still widely followed where the farms are small, or where the standards of farming are not high, as for example, among the lower classes of Russian peasantry. The method of covering the grain in ancient Egypt consisted of trampling the seed into the loose ground by hoofs of animals.

In hand sowing, the sower carries a basket or bag, slung over his shoulder, and walking up and down the field, scatters handfuls of grain with a semi-circular sweep of the arm. Since the casts must not overlap too much, the seed must not fall more thickly at one point than at another, consequently, manual-sowing requires no little skill and experience, particularly upon a windy day.

As late as the middle eighties, the grain in some sections of the United States after being scattered broadcast, was brushed into the ground with a drag made from scraggly wild plum trees. As time went on, bringing with it improvements, the harrow and other implements were used for covering the grain.

GRAIN SEEDING

Down and up, and up and down,
Over and over and over;
Turn in the little seed, dry and brown,
Turn out the bright red clover.
Work, and the sun your work will share,
And the rain in its time will fall;
For nature, she worketh everywhere,
And the grace of God through all.

With hand on the spade and heart in the sky,
Dress the ground and till it;
Turn in the little seed, brown and dry,
Turn out the golden millet.
Work, and your house shall be duly fed;
Work, and rest shall be won;
I hold that a man had better be dead
Than alive, when his work is done.

Down and up, and up and down,
On the hilltop, low in the valley;
Turn in the little seed, dry and brown,
Turn out the rose and lily.
Work, with a plan, or without a plan,
And your ends shall be shaped true;
Work, and learn at first hand, like a man—
The best way to know is to do!

ALICE CORY.

Hand seeders were the first mechanical development. Hand seeders marked an important development over the bag and wooden hopper sowing process. These are small machines, which allow the seed to flow from a bag on a whirling distributor while being rotated by a crank and gearing, or a bow. At the present time, hand seeders are used in fields where drills cannot be used advantageously, and for small areas.

As early as 1662, a sowing machine was invented, for it had long been recognized that accuracy, which is the essence of good sowing, could be better obtained by mechanical means.

In England, the early history of mechanical sowing is connected with Jethro Tull, who about 1730 invented the corn drill. This machine deposited the seed in rows, sowing three rows of grain at a time. It consisted of two seed boxes with a disk attached to each; a harrow followed the boxes to cover the seeds. That the greatest contribution to the early development of grain drills was made by Jethro Tull is borne out by the fact that in Crocker's "Dictionary of Arts and Sciences," published in London in 1765, the following description occurs: "A drill or drill box introduced by Tull plants the grain in rows, makes the

channels, sows the seeds in them, and covers them with earth when sown; and all this at the same time, and with great expedition."

The first patent on a seeding machine in America was granted in 1799, although the first important one was not granted until 1835. Despite the fact that a few drills had been brought over from England and introduced here with the purpose of establishing the manufacture of the machines, no permanent results were gained. By 1840 the manufacture of grain drills began in the United States.

Among the early inventors, who made very definite improvements in the invention of drills, were the Pennocks of East Marlboro, Pennsylvania. They succeeded in making considerable progress in the development of "the cylinder drills."

Before much time passed three types of drills were devised, each one having a different feeding device. The first to be constructed was the cylinder drill, built by the Pennocks and others; the second, was a slide drill in which the grain distribution was governed by means of a slide; the force-feed drills made up the third class, the first patent being issued by 1851.

By 1869 inventors turned their attention to shoe drills. Brown, of corn planter fame, had devised and introduced a shoe so shaped as to cut through or rise over obstructions; to adopt the invention to the grain drill was but a step.

The predecessor of the modern drill was crude. In Didsley's Annual Register for 1764, mention is made of a seed plow, which was mounted on two wheels, being drawn by one or two horses. It made several furrows at once and would sow any kind of seed and cover at the same time. Then followed many patents, some of them practical, others too complicated to be of service.

DRILLS, as we all know, deposit the grain in rows, below the surface, by means of hollow furrow openers or disks. The cup-feed and the force-feed are the most common and useful types. In the cup-feed drill a long box, carried upon wheels, is divided diagonally into two sections by a partition. The seeds drop through holes, the size of which can be regulated by

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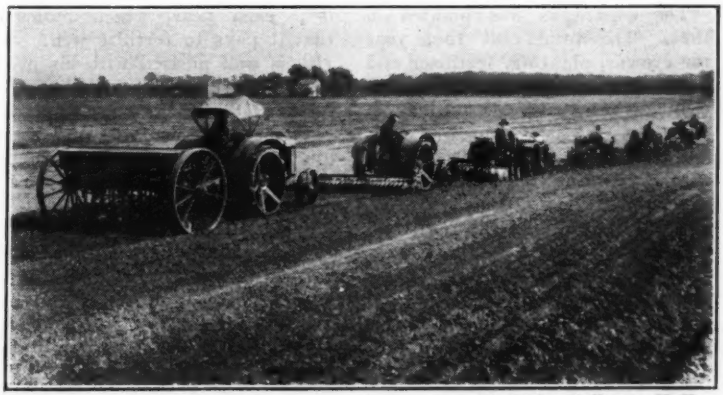
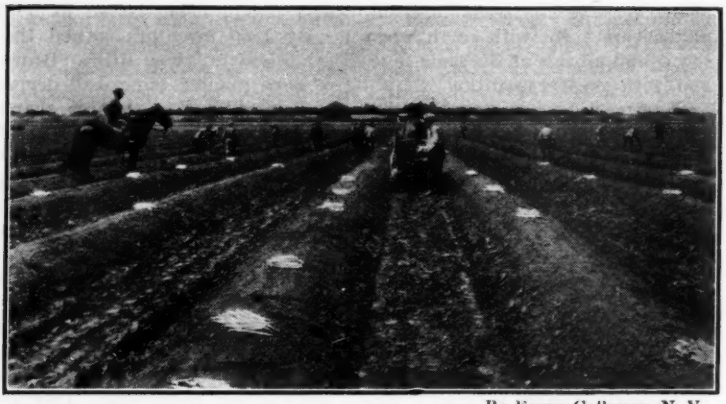


By Ewing Galloway, N. Y.

If acreage justifies seeding may be speeded by motor driven power or by big hitch teams



By Ewing Galloway, N. Y.

Harvesters at work in big field, with one-horse cart gathering up the piles of cut asparagus

ASPARAGUS

By C. Lee Gowan

County Agent, Aiken County, S. C.

¶ *Tips for profit.*

TWO acres of asparagus owned by C. J. Hill, of Aiken, S. C., paid for themselves and returned a profit of $685 in three years.

The asparagus was planted in 1924. The total cost that year for crowns, planting, fertilizer and cultivation was $95. The second year the total cost for cultivation, fertilizer, and harvesting was $160, and the third year $170, making a total of $425 expended the first three years. The second year $425 worth of asparagus was cut, and the third year $685 worth of grass was cut from the two acres, leaving a clear profit of $685 above all expenses and two acres of crowns which are good for profitable production for 10 or 12 years more.

One ton of a 7-5-5 (PNK) commercial fertilizer and 10 loads of compost have been applied to this field each year, which indicates that it pays to fertilize well. Mr. Hill is well pleased with his project and says that he believes every farmer in Aiken county should plant at least two acres of asparagus as it fits in so well with the system of cotton farming.

The cutting season begins in March and ends in April just before farm labor is needed to chop cotton. Therefore, a few acres of asparagus give profitable employment to the labor for a longer period during the year, and two acres would not require any additional labor to carry it along with the other crops. Another very decided advantage in growing some

By Ewing Galloway, N. Y.

Shearing butts off asparagus tips—this grower has a simple but highly efficient method

asparagus is that the returns come in just at that time of the year when a farmer's change is running low and he needs a little available cash for cotton chopping.

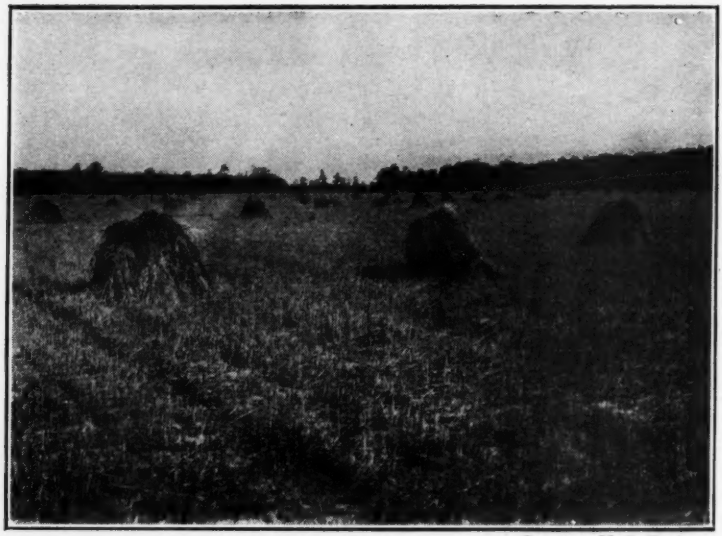
Last season was one of the best seasons the asparagus growers have had. They had more grass to ship and received better prices according to L. C. Eidson, secretary, treasurer, and manager of the South Carolina Asparagus Growers Association with headquarters at Williston, S. C. The Association shipped 223 cars, averaging about 460 crates per car, of the famous brand of Dixie asparagus which is so popular on the northern market and which has brought the farmers of Barnwell, Aiken, Saluda, and Edgefield counties quite satisfactory returns. There were 91 cars shipped from Williston, 68 from Ridge Spring, 53 from Trenton, and 11 from Johnston, in addition about 10,000 crates or 20 cars were shipped by express.

The net price per crate jumped from $1.05 the first year of the Association's shipping to $3.42 per crate in 1924, $2.25 per crate in 1925, and during the 1926 season one farmer showed us his returns of $53.03 for 13 crates, which show an average of a little better than $4.00 per crate.

The Association has had quite a successful career and has been the salvation of the asparagus game for this section. It handled in 1922, 116 cars which netted $169,535.41; 1923, 118 cars which netted $202,031.14; 1924, 140 cars netted $253,009.39; 1925, 205 cars netted $250,000.

THE Association began shipping point inspection the past season which is insuring a uniform product of high quality and has had a decided influence for a better price on the northern market.

There are two types of asparagus sold on the market, green asparagus and white asparagus. The green asparagus is the type produced in the South Carolina section. It is very tender and palatable. The green grass is produced by allowing the shoots to remain in the bed until they are four or five inches high, and that portion above the ground exposed to the sunlight turns green.



Courtesy U. S. D. A.

This wheat was grown on Coastal Plain soil low in organic matter and in poor condition. The fertilizer used was 300 pounds of acid phosphate per acre on corn preceding the wheat. The yield was 8½ bushels per acre

Courtesy U. S. D. A.

Here is a field on an adjoining farm, identically the same soil but brought up into good condition. Wheat followed clover sod and in part potatoes which had received 1,000 pounds of a 5-7-7½ per acre. The fertilizer used on the wheat was 300 pounds per acre of a 3-7-7½. The average yield from 100 acres was 30 bushels per acre

Better Grains *and* Hays

By *The Soil and Crop Service*
Potash Importing Corporation of America, New York City

THERE are two important ways of increasing profits on grain and hay farms: 1—better quality as well as higher yields of grain; 2—saving the feed bills.

1. Do you want better returns from your grain crops? Why not improve the quality, as well as the yield? Quality pays. For instance, under average conditions, there is usually a difference of three cents a bushel between the different grades of wheat. If No. 1 wheat is selling at $1.28, No. 2 will probably be $1.25; No. 3, $1.22; No. 4, $1.19; No. 5, $1.16. The difference in price between grades No. 1 and No. 5 is 12c. Millers demand better grades. Good soil management and the right fertilizers improve the yield and grade. Add an extra value to each bushel as well as extra bushels to each acre.

Better quality goes with increased yield. The shriveled wheat was unfertilized and yielded 2.7 bushels per acre. The plump, firm wheat was fertilized and yielded 19.4 bushels per acre

2. No farmer can afford to let his feed bills consume all the contents of the milk pail. The big problem is to save the feed bills. Good methods of soil management, seed selection, and the use of the right fertilizers mean more grain, forage crops, pastures on the farm, and less feed to buy. All the homegrown feed the farmer can produce means cash saved. The price of bought feed includes heavy charges for transportation and distribution which the farmer pays when he buys feed.

A big yield of the best quality grain, forage, and hay crops on the farm where they are fed, is one of the quickest roads to better profits. One of the surest means of securing better yields and quality, and at the same time reducing the cost of production, is by the proper use of the right fertilizers.

Why? Because the price of fertilizers is low. They are among the

cheapest of farm supplies. The farmer's dollar will buy more in terms of fertilizers than in terms of anything else he buys. Money spent on the right fertilizers is not an expense; it is an investment. A few pounds of high analysis fertilizer produce many pounds of bulky feed. The saving should be in the cost of production—not in what is spent on fertilizers.

Thus, there are two big opportunities for making a profitable investment in fertilizers on many farms where grain, forage, and hay crops are grown for the market or for feeding on the farm.

WHAT are commercial fertilizers? It is important to be clear regarding what commercial fertilizers are and their effect on grain and hay crops.

Stamped on any bag of mixed fertilizer, or it may be on a tag, are some figures. For instance, the figures may be 3-8-6. These figures mean something. They mean that there are 3 per cent nitrogen (sometimes called ammonia), 8 per cent phosphoric acid (sometimes called phosphate), and 6 per cent potash—that is, a total of 17 per cent plant food, or 17 pounds of plant food in every hundred pounds—340 pounds of plant food in a ton. These three figures are the analysis. A 3-8-6 (17 per cent plant food) is a high analysis; a 1-8-1 (10 per cent plant food) is a low analysis.

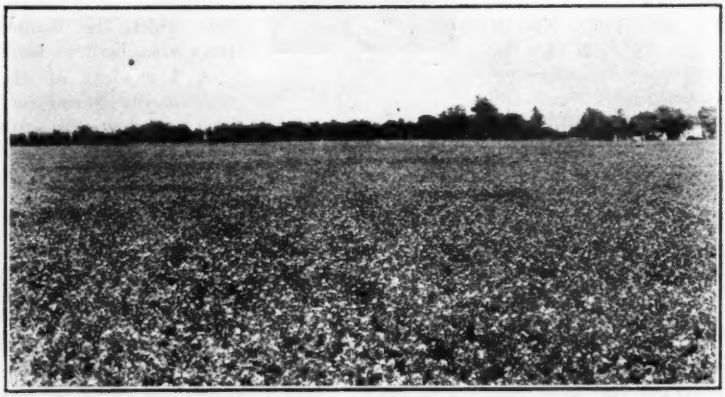
Some manufacturers are now putting out "double strength" fertilizers. For instance, an analysis 6-16-12 may take the place of a 3-8-6. When a "double strength" fertilizer is used, of course, only half the quantity is needed.

Watch for two things when buying fertilizers:

First, the fertilizer should be bought on the basis of the number of pounds of plant food in each ton of fertilizer, and not on the price per ton. See that you buy a fertilizer with a total analysis of at least 16 per cent plant food.

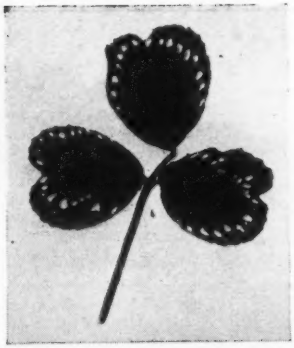
Second, buy the right analysis. Be sure that the fertilizer mixture contains the right percentage of each plant food—nitrogen (ammonia), phosphate, and potash. It is this point—the right percentage and why you should insist on the right percentage—that we are going to discuss in this article.

Nitrogen, phosphate, and potash



Courtesy Armour Fertilizer Works

A bumper crop of red clover. There is no potash starvation here



1st Stage of Potash Starvation: White spots appear around the border of the older leaves

are three brothers. Each has his own job to do in producing bigger and better grains and hay. No one brother can do the work of the others. They must be together and work together.

Nitrogen (*sometimes called ammonia*) is brother No. 1. He has to do the big job. He builds the factory. When a good factory has been built the grain crops—wheat, oats, rye, and barley—are dark green in color. The stems and leaves are well developed, the stems are tall and strong and the leaves dark and vigorous.

If the factory is over-built, by too much nitrogen, the grain will mature late; it will be poor in quality; and the crops will lodge.

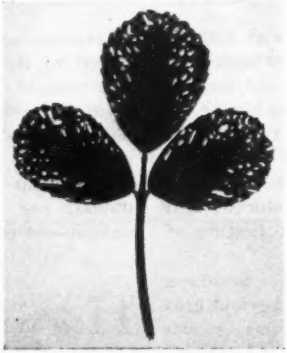
Too little nitrogen will produce small plants of a yellowish-green color.

Nitrogen builds the factory, the structure of the plant. The other two brothers—phosphate and potash—provide the equipment within.

Phosphate assists in the development of plump, full grain and hastens root development, particularly in young plants. When plenty of phosphate is available the grains mature earlier. When there is not enough phosphate the grains ripen slowly and there is not enough grain to straw.

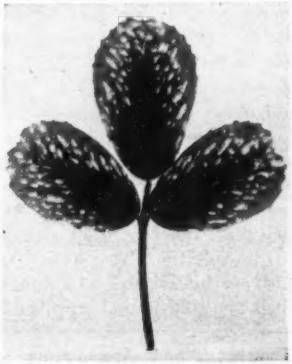
Potash is the third brother. What is his job? It is to produce quality in the grain—plump, sound grain and stiff straw that does not lodge.

When potash is lacking, the straw is weak; the grains ripen too early; the stems and leaves die while the grain is still immature; the grain lacks quality.



2nd: White spots invade center but never the midrib

Very striking proof of the effect of fertilizers on improving the quality of wheat has been obtained in practical field tests, both in the eastern and middle western wheat areas. In the East, Professor G. L. Schuster, at the Delaware Agricultural Experiment Station, found that the grade of wheat was improved very



3rd Stage: Borders turn yellow, dry up, and turn under

Clover grew thick and strong on the limed ends of these Ohio experimental plots

much by the proper use of fertilizers. The grade is decided largely by the plumpness of grain and the test weight per bushel. *The higher the test weight, the higher the yield of flour from a bushel of wheat; the larger the proportional amount of higher grade flour produced; and the better the color and texture of the bread.

For instance, C. J. Schollenberger, of the Ohio Agricultural Experiment Station, has shown that 62-pound, soft, red winter wheat yielded approximately 72 per cent flour, and 54-pound wheat, 66 per cent flour. This represents a decrease of 1 per cent in flour yield for every 1½ pounds decrease in test weight.*

Therefore, a difference of a pound or so in the test weight per bushel is important. It makes a difference in the grade and in the money received for the crop.

Professor Schuster found that on one plot where he used nitrogen and phosphate alone the test weight per bushel was 55.1 pounds, but when a 120-pound application of muriate of potash per acre was added to the same treatment, the test weight per bushel was increased to 58.8 pounds. This was not for one year alone, but the average for several years. The test weight was, therefore, 3.7 pounds per bushel heavier where potash was used.

HOWEVER, this is not the only point. A variation in grade from year to year reduces the profits. For instance, on plots where no fertilizer was used the test weight per bushel ranged from 42 to 59 pounds, or a range of 17 pounds per bushel. This means that the wheat one year was in one grade and the next, in another—different grades each year. When phosphate and potash were added, the range was less, from 54 to 60.5 pounds per bushel, a difference of only 6.5 pounds. When a complete fertilizer—nitrogen, phosphate, and potash—was used the range was again less, from 57 to 61 pounds per bushel, or a difference of only 4 pounds. Note, too, the test weight was increased by using fer-

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* Thatcher, "Soil Amendments and Wheat Quality," in Journal of Amer. Soc. of Agronomy, Vol. 18, pages 631-632, Aug. 1926.

Placing the Blame for Surpluses

By Arthur P. Chew
United States Department of Agriculture

"SURPLUSES of farm crops," said a speaker at a recent convention of economists, "are the Lord's affair more than man's." He meant, of course, that the volume of production is affected to a greater extent by yields per acre than by acreage.

Thus in 1919, as the speaker showed, a corn acreage 7.5 per cent less than that of 1918 produced 12.5 per cent more corn. On the other hand the crop of corn in 1924 was 20 per cent smaller than that of 1923, although the area planted was a million acres greater. Wheat growers in 1924 put 9 per cent less land into wheat than in the preceding year, yet harvested a crop 15 per cent larger. The inference is that there isn't much the farmer

This cotton, being loaded into a British ship at Gulfport, Miss., looks as if it ought to be worth money to the growers

can do to prevent the production of surpluses.

Is that, however, a fact? Even if it is true that variation in yields per acre is a bigger factor than changes in acreage in determining the annual volume of production, it doesn't follow that the farmers should throw up their hands in despair and let acreage look after itself. That would be the case only if the influence of nature were overwhelmingly greater than man's influence on the amount of production. But nature's say in the matter seems to be only slightly more authoritative than that of the farmers. Acreage changes are nearly as important as yields in determining the production of cotton, some kinds of wheat, and oats in the United States. There are no crops in the production of which acreage changes are unimportant.

These statements are made on competent statistical authority, which I will quote in some detail in a moment. But first it may be useful to note their bearing on the perennial surplus problem. There is a disposition to think of the approach to the solution of this problem as wholly one of marketing. If there is nothing the farmers can do to regulate the volume of production, their one recourse is to hold excess supplies out of consumption until buyers offer a favorable price. That calls for the organization of monopoly controls to fix prices—a risky and dubious proceeding. The outlook becomes more hopeful when you go on the other tack and see what can be done by the control of acreage, to eliminate surpluses. This is not fanciful, Utopian, or impractical, if what has been said about the part played by acreage in the volume of production can be sustained.

LET us see. The relative influence of acreage and yields per acre on the volume of certain crops has been investigated statistically over many years by Bradford B. Smith and also by Lewis H. Bean. Mr. Smith was formerly, and Mr. Bean is now, an economist in the United States Department of Agriculture. Incidentally, the two men do not agree entirely in their views as to what is possible in the way of controlling production by regulating acreage. As to this, Mr. Smith is much more hopeful than Mr. Bean. It is, therefore, inter-

Raising fine pigs is only half the battle of the American hog producer. He may lose money if he lands them on the market at the wrong time

esting to observe the big part each assigns to the influence of acreage changes on production.

In the case of cotton, Mr. Smith calculates that nearly half of the variation in production in the past has been due to acreage changes. This suggests, he says, that a fair range of adjustment possibilities lies open to the cotton growers. If you want the exact figures, Mr. Smith reckons that 54.4 per cent of the variability in the production of cotton in the past has been due to variations in the yields per acre, and 45.6 per cent to variations in acreage. In winter wheat production he assigns an extraordinarily high relative influence, 63.5 per cent, to changes in acreage.

And now what is the testimony of the economist who is more skeptical as to the extent to which the farmer can control his own destiny in the matter of surpluses? Mr. Bean declares that the production of soft red winter wheat has been determined 54 per cent by yield and 46 per cent by acreage. This result is not necessarily inconsistent with Mr. Smith's finding as to winter wheat, since it covers only a single variety. In any case, it is significant that Mr. Bean grants the soft red winter wheat producers pretty nearly an equal voice with nature in determining the volume of their output.

For oats, he figures the influence of acreage changes is 49 per cent and the influence of yield per acre 51 per cent. Corn, because of its immensely larger and more stable acreage, is less influenced by acreage changes in the variation of its production. The ratio for corn, says Mr. Bean, is acreage 22 per cent and yield 78 per cent.

THESE figures show that farmers might control the volume of their production to a much greater extent than they do. They would have to get together, and they would have to drop the idea that crop prices at planting and seeding time are a safe guide as to whether acreage should be increased or decreased. These, however, are not insurmountable difficulties. Already, more than 2,000,000 of our 6,000,000 farmers are organized in cooperative associations, and are all set for collective action to influence the volume of production by intelligent adjust-

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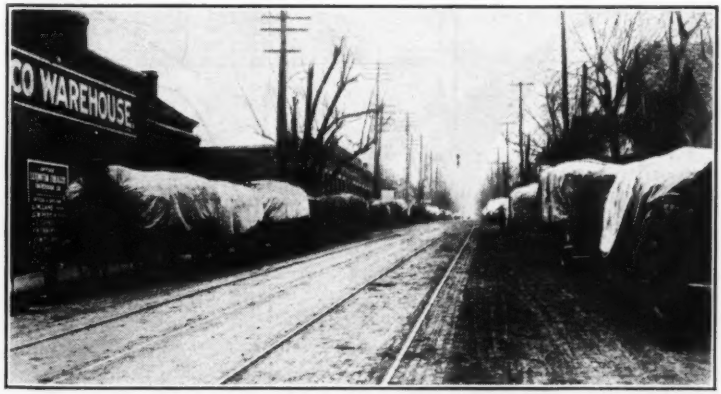

Lexington, Ky.—Wagons of Burley tobacco awaiting their turn to be unloaded at auction warehouses

The Long-Time

By G. J. *Callister*

THE long-time outlook for fertilizer consumption is bright. The ultimate prospect is for a decided increase in consumption —for tonnage to return to the normal trend. That time is worth waiting for—worth striving for.

The following are the reasons:

The big "why" is found by looking backward and looking forward, as well as to the present; in other words, examining the long-time trend of fertilizer consumption. Any essential business that is worth while must be handled in reference to the future, as well as to the immediate economic needs. Only an opportunist lives solely in the present.

What does this long-time trend in fertilizer consumption tell us?

To obtain a true picture of this trend, first glance backward. For the 21 years—1900 to 1920—there was an average annual increase in fertilizer consumption of 245,900 tons, or an average annual increase of 4.8 per cent. It was not the same every year; in some years it was more; in others less. However, it was a period of expansion

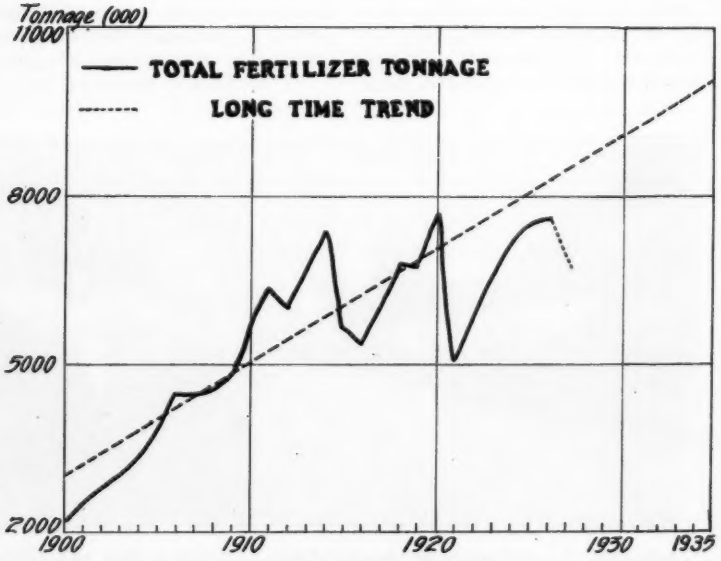

Chart 1—Fertilizer consumption over a long-time period will go steadily upward

Fertilizer Trend

¶ Showing that confidence in the industry is warranted

in the consumption of all fertilizers, *chart* 1.

What were the causes of this upward trend? During this period, especially from 1897 to 1913, prices of agricultural products increased faster than the general price level. Values of crops per acre increased rapidly. Also, during the same period, the population of the United States increased at the rate of 1.8 per cent each year. The physical volume of production in the United States increased at the rate of 3.2 per cent each year. There was an increasing pressure of population on food supplies.

Thus, the long-time trend in fertilizer tonnage sold was upward. This trend (*chart* 1) which shows the actual tonnage and trend, probably represents the normal growth of fertilizer tonnage in relation to population, increasing intensiveness of crop production, and other factors.

For short periods of time, however, because of a variation in the relation of these factors, the tonnage may be considerably below the trend. This was true for the periods 1900 to 1904 and in 1915 to 1917. In other periods it may be above the trend as in 1909 to

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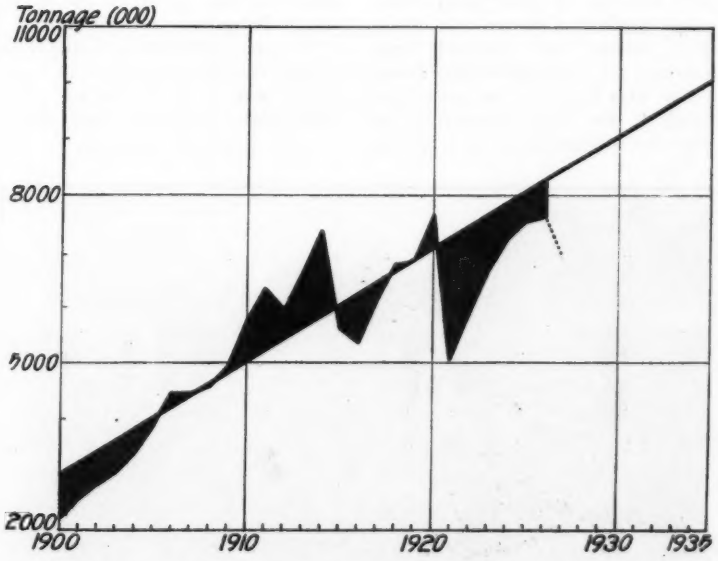

Chart 2—The alternating periods of depression and expansion tend to balance each other

By P. M. Farmer

THE $10,000,000 campaign against the corn borer was officially launched by the Secretary of Agriculture March 14, and at this time there is feverish activity in 91 counties of New York, Pennsylvania, Ohio, Indiana, and Michigan, where the infested area amounts to some 60,000,000 acres.

The idea back of the campaign, which is the most pretentious of any ever attempted, is to delay the spread of the borer into the corn belt proper. It is not expected that the insect will be eradicated; in fact, only a part of the infested territory is included in this intensive campaign provided for by an act of Congress.

The appropriation is being used to pay salaries of extra men needed, to pay farmers for the extra work above ordinary farm opera-

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Destroying cornstalks with oil-burning apparatus

POTASH PAYS

By G. E. Langdon
Wisconsin College of Agriculture

SPARING the potash will often spoil the crop for the farmer who is using peat or muck soil. Potash is commonly the first requirement on such soils after they are drained, and in most cases there is no hope of steering a profitable course without it. Potash must be applied just as seed must be sown.

This is the belief of soil experts at the Wisconsin College of agriculture who have made careful study of crops and fertilizers best adapted to peat, muck and marsh border soils.

Where marsh soils form only a part of a farm they should be devoted to crops which dovetail in with the general scheme and which are adapted to the locality. Corn, root crops, soybean hay, and alsike and timothy generally do well on marsh soils. Small grain should be used only as a nurse crop for seedlings. When the frost hazard is small there is no objection to a corn, soybean, corn, grain, and three-year hay rotation. Crops which can be grown successfully on new breakings are limited, but buckwheat, flax, alsike, soybeans and corn are commonly the first crops. After the soil is subdued, more crops can be grown.

The potash salts vary in purity

from 12.5 to 60 per cent of potash and are priced accordingly. They are called kainit, manure salts, muriate of potash, and sulfate of potash. The last two are the ones most commonly used in Wisconsin. The muriate of potash is suitable for all general farm crops, but for tobacco, sugar beets and some others the sulfate is preferred. Where potash alone is the limiting factor, these materials offer the cheapest and most suitable means of applying potassium.

"Rates of applying potash will vary with the kind of crops grown, the acre value of the crop, potash content of the fertilizer, the method of application, and the amount of manure applied," explains A. R. Whitson, head of the soils department, Wisconsin College of Agriculture. "For general farm crops such as corn, grains, and hay (not including alfalfa) when little or no manure is used, applications of muriate of potash twice or three times per rotation, so that the total for the rotation amounts to about 75 pounds per acre should be made. This would mean an application of about 300 pounds during a four-year rotation. A part of this should go on corn in the hill or drill and the balance be applied to the grain crop. In general, applications should be made annually or biennially.

"If special crops of high-acre value, and using considerable labor, are grown in a short rotation with other general crops, the entire potash application should be made (with or without phosphates) to the special crop in the manner best suited to it. The following crops would utilize the residues of the application."

Timothy and alsike clover are grown extensively on marsh soils in central and northern Wisconsin, usually being one of the first crops planted. On peat soil near Bancroft, Wis., the yield of hay in 1917 was increased from 1¼ tons to 3 tons an acre by the use of phosphate and potash fertilizers applied in 1916.

AN experiment carried on at the university farm at Madison from 1919 to 1923 on the use of potash gave the following results: Shelled corn per acre resulting from no treatment was 22.8 bushels, and from the use of 400 pounds of muriate of potash was 67.7 bushels. A yield of 2,205 pounds of cured hay per acre resulted with no treatment while muriate of potash produced 3,645 pounds of hay per acre. In other experimental work with corn, oats, and rye the fol-

lowing gains were made by the use of 150 pounds of muriate of potash over five-year and three-year periods: corn silage increased from 3.3 to 5.2 tons, oats increased from 16.47 to 34.06 bushels; and rye increased from 8.30 to 22.84 bushels.

Potatoes are easily grown and harvested on peat and muck soils. Since they are very sensitive to free soil water they should only be attempted on tile-drained lands, on sandy marsh border soils, or along the ditches where a sand subsoil causes good drainage. Danger of frost should always be considered. When fertilized the quality of potatoes is entirely satisfactory; unfertilized, they will be small and soggy. The fertilizer in amounts up to 500 pounds per acre, can safely and should be applied beneath or at one or both sides of the seed pieces. If potatoes are not in danger from frost, and a good market is near at hand, 600 to 1,000 pounds of a mixed phosphate and potash fertilizer per acre may be warranted, but in that case 200 to 500 pounds per acre should be applied in rows and the balance broadcast.

The amounts of fertilizer recommended are for the phosphate and potash, but if muriate of potash alone is needed, 200 to 300 pounds per acre is ample. The work is best done with a potato planter with a fertilizer attachment.

How to know whether plants

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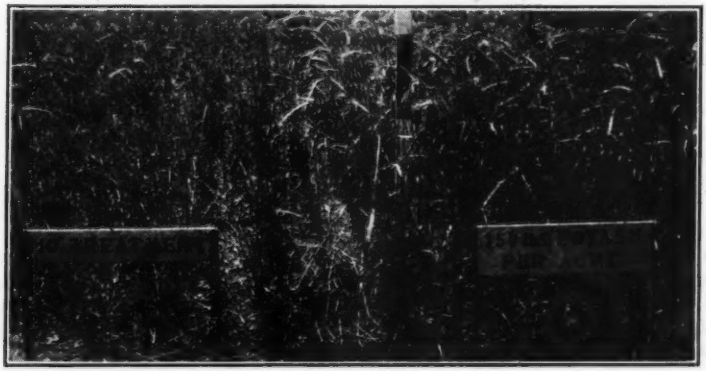


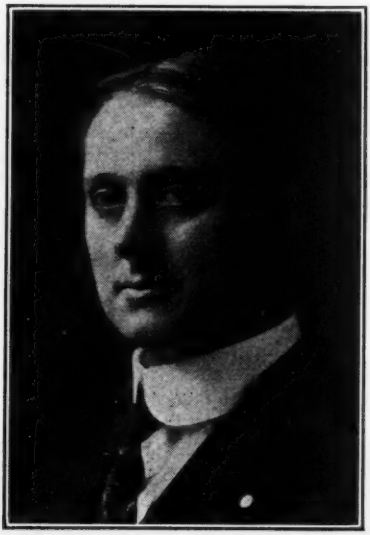
FLORIDA

By J. Francis Cooper
Editor, Florida Agricultural Experiment Station

¶ *The twelfth stop in our experimental journey.*

ALTHOUGH Florida was one of the first States in the United States to have a settlement of white men founded within its borders, the State is camparatively young from the standpoint of agricultural development. The Florida College of Agriculture did not come into being until 1884, and the Experiment Station was established in 1888.

Both the College and the Experiment Station were located at Lake City until 1906, when the Agricultural College was combined with the East Florida Seminary and some other institutions and moved to Gainesville as the University of Florida. Prior to this time small branch stations had been established at Fort Myers in South Florida and at DeFuniak Springs in West Florida. Both branch stations were discontinued when the Station was moved to Gainesville.



Dr. Wilmon Newell, dean of the Florida College of Agriculture and director of the Agricultural Experiment Station

Early in 1906 Dr. P. H. Rolfs became director, and his name is associated with much of the development of the Station until 1920, when Dr. Wilmon Newell the present director of the Experiment Station and dean of the College, took charge.

It is in recent years that much of the growth of the Florida Station has taken place. The Station now maintains branches at Quincy for the study of tobacco, at Lake Alfred for the study of citrus, and at Belle Glade for the study of Everglades farming. In addition, there are a number of field laboratories located at different places in the State where investigators are

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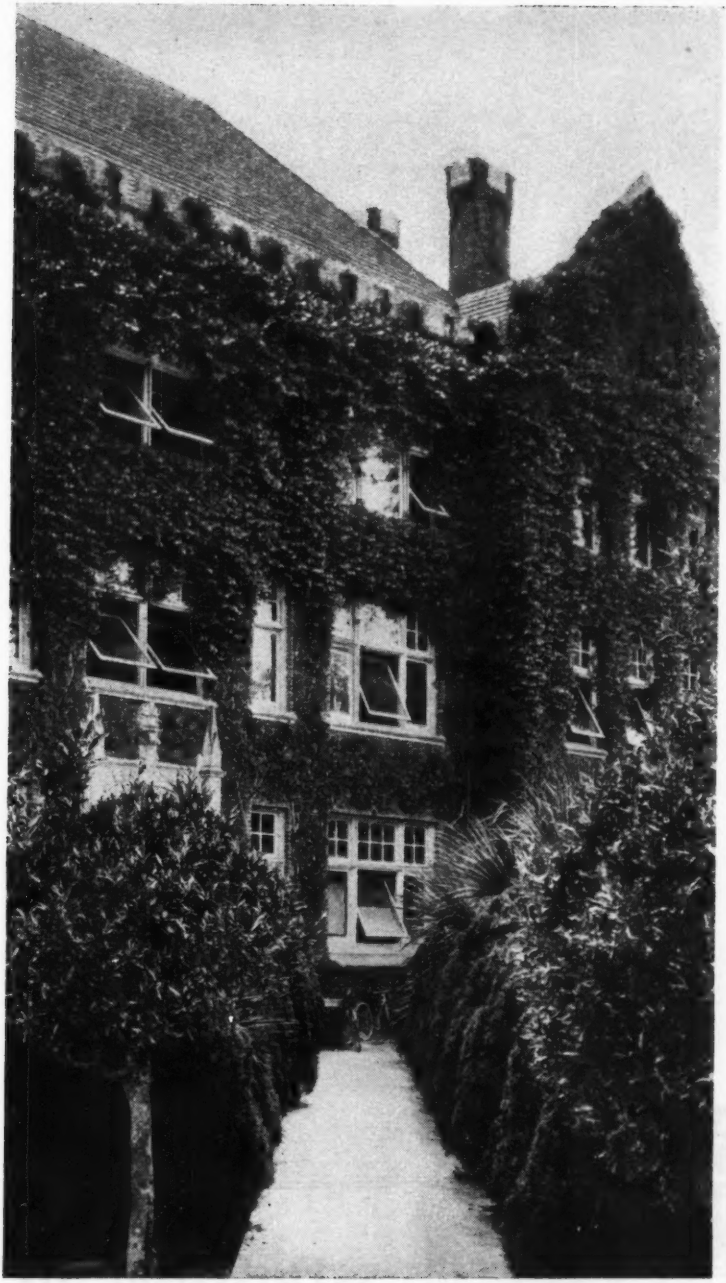
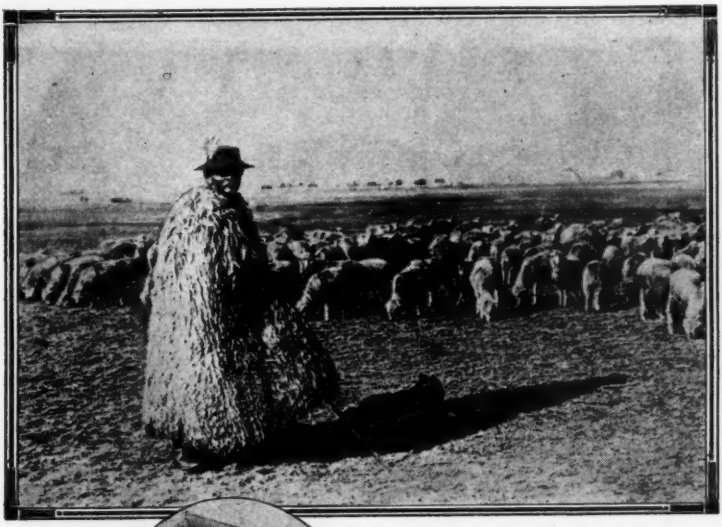
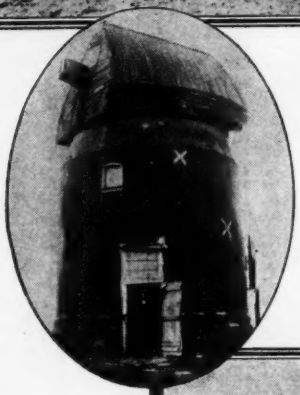


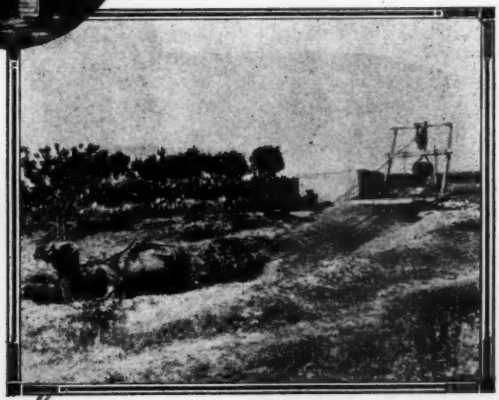
Entrance to the Florida Agricultural Experiment Station Building



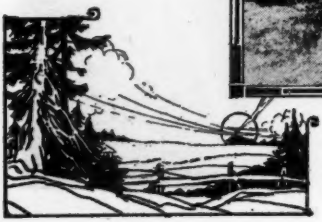
Hot or cold, he always wears his coat. This Hungarian shepherd does not discard his lamb's wool coat even in summer heat.



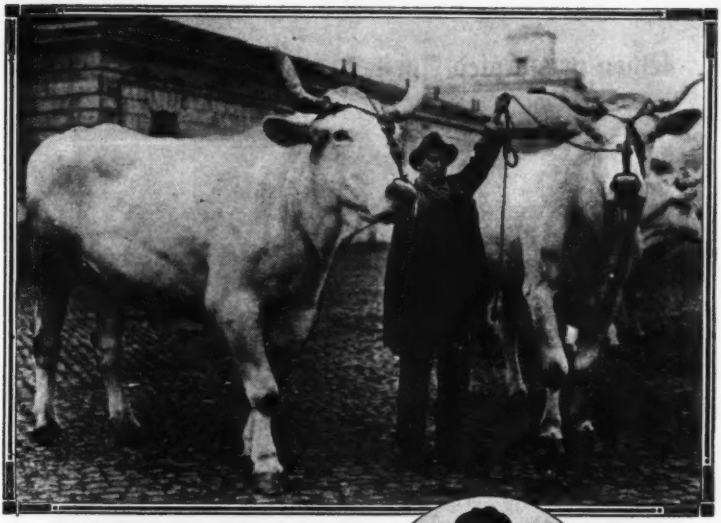
This famous old 15th century mill at Yaxley, England, is still being worked.



A camel well in Arabia. The Arab boy, lying under the bushes near by, shouts his commands to the patient beast which walks slowly forward and then backs up bringing the water to the surface to irrigate the crops



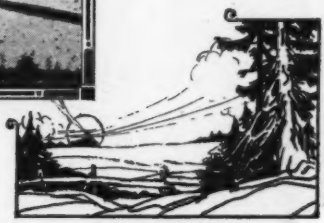
Farming in



We do not wonder that some people regard these white bulls of Italy as sacred. Compare their great size with that of a full grown man.

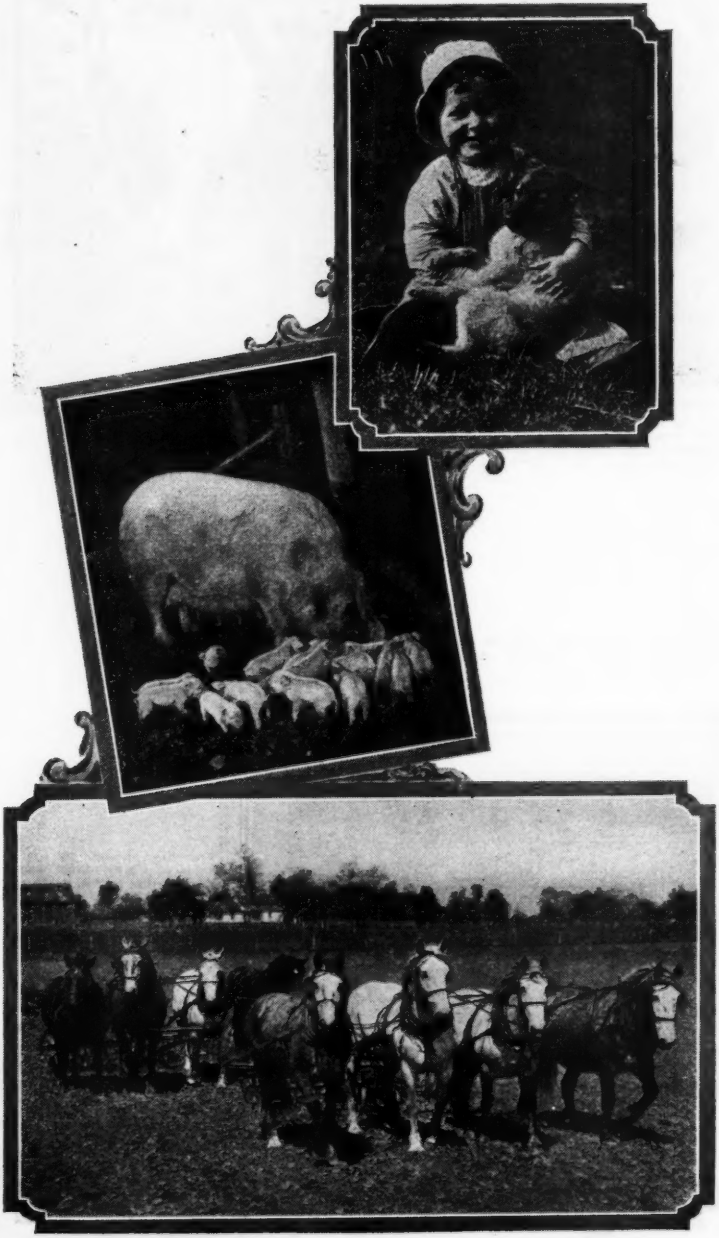
In domestic Russia the peasants still sow their grain in this primitive fashion.

Traveling across the rice fields of China offers beautiful vistas as well as a genuine thrill. Of added interest is the knowledge that rice has been grown in China in fields such as these since 2800 years B C.



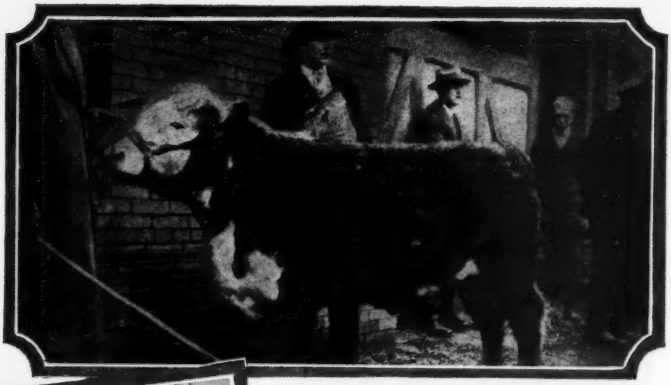
other Lands—

When proud-pied April, dressed in all his trim,



Hath put a spirit of youth in everything.

—Shakespeare



R. E. Underwood, County Agent of Adams county, Pennsylvania, standing beside the grand champion Hereford in a recent show of baby beeves fed by boys and girls of four Pennsylvania counties. This animal brought its youthful owner $402.75.

Mrs. William M. Jardine, wife of the Secretary of Agriculture, inspecting the new Amaryllis varieties at the recent show held in Washington, D. C.

Lloyd S. Tenny, recently made Chief of the Bureau of Agricultural Economics, U. S. D. A., by Secretary Jardine.

The Editors Talk

As for the necessity of this art, it is evident enough, since this can live without all others, and no other without this.—Abraham Cowley, 1618-1667 from an essay on the art of the husbandman.

WE recommend the article on page 5 as one of the best in this issue. Why? Because it shows how county agents are building a true and national prosperity.

THE KEY TO PROSPERITY

Prosperity is something every one desires but relatively few enjoy. The bed-rock on which rural prosperity is built is the soil. As the soil, so is the man. A poor soil breeds a poor spirit, and a poor spirit is the forerunner of mere existence. But a fertile soil alone is not sufficient. It must be the basis of a well rounded program, a business program that will use all the mental and material resources of the community.

That such a community can be developed is strikingly shown by the work going on in Lawrence county, Missouri. Lawrence county is in the Ozarks. The good people of the county did not inherit the best of land, but the leading farmers and business men of the county, with the help of the county agent, A. W. Klemme, and the Missouri College of Agriculture, got together and now have a fine record of work accomplished as a beginning to true prosperity.

Of outstanding importance is the way that Mr. Klemme analyzed the problem. That is the first step—a most important one. Briefly, the soil of the county was depleted by 60 years of continuous cropping, yet the farmer of today must pay 10 times as much land tax as his grandfather did and 10 times as much tax for comforts and education. Besides these he must have concrete highways, modern homes, and motor cars, all of which must come from the soil "which produced in its virgin state only the cabin, the road through the clearing, and the old spring wagon."

Mr. Klemme's analysis showed that a more fertile soil was needed as the basis for dairy farming—a sound business built on a fertile soil. He analyzed the problem from all angles. Then he formulated his plan from the bottom up in seven steps. They might be called keys to prosperity. But some keys fit and some keys do not. There are all sorts of keys. By his sound analysis Mr. Klemme fitted the keys to the right locks.

What are the results so far as measured by true prosperity? "Active farm leaders have developed as a direct result of the soil fertility campaign. They have adopted the program as their own—they have had a part in developing it. An atmosphere of optimism and progress pervades the county, for the people now see their way to 'growing concrete highways, modern homes, and motor cars out of the same soil that produced in its virgin state only the cabin, the road through the clearing, and the old spring wagon.' "

This is a type of true prosperity. We earnestly commend this example to our readers. There are, no doubt, many other such counties. It is an example of the work done by leading farmers and that faithful body of workers, the county agricultural agents, to find the right key to a national and true prosperity. The greater the support given them, the truer and more lasting our prosperity will be. The county agricultural agents deserve much more support than they often get.

A sweet disorder in the dress
Kindles in clothes a wantonness;
A lawn about the shoulders thrown
Into a fine distraction.
—Robert Herrick, 1591-1674.

PARADE IN COTTON PLEASE

WILL you use cotton for clothing this summer? There is a lot of cotton left and some people yet wear a few clothes.

Here is the inducement. "The American summer climate affords a strong inducement to use cotton as clothing material for both sexes." This is vouched for by the Department of Agriculture in a recent news release.

Then with becoming caution, the Department proceeds to woo fashion in her den. It whispers,

"Style arbiters in this country, it is believed, could be of great assistance."

"Faint heart never won fair lady," and by the same token it never won a style arbiter—that is why they are style arbiters. Why not a bold advance?

Continuing, the news release says that designers should make fabrics more attractive and science should study finishing and laundering, all of which is very commendable.

But why do people not use more cotton for clothing? There must be some objections or they would use it. Cotton has to compete with other clothing materials. The objections should be fully and persuasively answered until more people are won over to more cotton. For, "he who only knows his own side of the case, knows little of that."

Cotton clothing should be used more than it is. The work of the Department of Agriculture is to be highly commended and deserves every support, but if "Queen Cotton" is to become more popular, it will be necessary for her to put up a stronger inducement than the weather and a pious hope in style arbiters—a fickle pair, both of them.

> *It is the surplus produce of the land . . . that maintains the unproductive class. The establishment of perfect justice, of perfect liberty, and of perfect equality is the very simple secret that most effectively secures the highest degree of prosperity of all classes.—Adam Smith,* 1723-1790.

SURPLUSES

SURPLUSES are of two kinds—human and crop. In some parts of the world a human surplus piles up, in other parts a crop surplus.

The problem is to balance them, that is, to get surplus crops to surplus populations. There are two broad avenues of approach. One, to organize marketing after the surplus is produced; the other, as discussed by Arthur P. Chew in this issue, is to control production and so try to avoid a large surplus. There is an increasing tendency to emphasize organization of

production by controlling acreage. It is argued that acreage is nearly as important as yields in its influence on total production, therefore, a control of acreage will control production. Eventually, business men, the economists, and politicians, with the help of some common sense, will solve the problem.

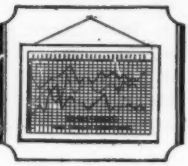
It may be safely said, however, that the problem of crop surpluses, whether the production or the marketing phase is emphasized, will never be satisfactorily settled on a sectional or even on a national basis, because human life itself is involved. The life of the world is increasing, therefore, the means to life —crops—must increase also. For the final adjustment of the problem of crop surpluses, therefore, nothing less than a world-wide outlook will be sufficient. Many long years will be required in which to put into effect a really satisfactory solution of the problem.

In the meantime, the farmer has to produce his crops. His immediate question is—how many acres of potatoes or corn, or cotton shall be planted? What can he do and what should he do about the question of a possible crop surplus? If he endeavors to regulate the marketing, that calls for a monopoly control to fix prices. Mr. Chew considers it far better to control acreage, and so reduce the possibility of a crop surplus. He points out that some 2,000,000 to 6,000,000 farmers are organized in cooperative associations and "are all set up for collective action to influence the volume of production by intelligent adjustment of crop enterprises to probable market needs."

Deciding acreage on past prices results, he considers, in considerable overadjustment. The principle of the suggested remedy is a closer alliance of economic science with practical farming. The remedy implies the necessity of a crop "demand forecast," and adjusting crop production to it. But how the crop acreage would be prorated between several millions of farmers, and what obligations the individual farmer would be under to abide by that acreage, and other questions, are big problems that yet need much consideration.

Undoubtedly, however, this shift from the emphasis on marketing a surplus to an emphasis on balanced production, is a step in the right direction. It is getting at the root of the problem. Developed to its fullest extent, from a world crop production view-point, it would be a long stride forward in assuring the man on the land a fair wage and the world's population an adequate means to life. Both demands must be satisfied for the world as a whole, before there will be a permanent solution of the crop surplus problem in any part of it.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

Cities Demand Safe Milk

Eight hundred and seventy-four cities and towns now have ordinances requiring the tuberculin testing of all cattle on farms furnishing milk for consumption in those cities. According to a survey made by the Department of Agriculture, practically all of these ordinances are well enforced. Small communities are now becoming almost as active as the larger cities, but the action of such cities as Chicago, Cleveland, Detroit, and Louisville has done much to stimulate such protective measures in other communities. Three hundred and seventy-five cities make it optional whether or not the producer has his herd tuberculin tested or whether he pasteurizes the milk. This makes a total of 1,249 municipalities that have taken means to protect their residents against milk that might carry disease. Fourteen States also have passed laws or regulations requiring the tuberculin test, and specifying that the test be applied by an approved graduate veterinarian.

Potato Dislikes Heat

The old expression "cool as a cucumber" might very well be changed to cool as a potato, for it has been found that the potato plant will not set tubers if the temperature in which it is growing remains regularly above 68 degrees Fahrenheit. The reason the plants do not set tubers at higher temperatures is thought to be the high rate of respiration or breathing which causes the carbohydrates—starches and sugars—to be consumed. At the lower temperatures starches and sugars are stored up in the tubers. These results explain, at least to some extent, why the great potato-growing regions are in the cooler parts of the country such as Maine, New York, Michigan, Wisconsin, Minnesota, Idaho, and some other States.

Less Work for Bread

Men now get bread for much less sweat than was formerly necessary. In a recent report prepared by the Department of Agriculture on research in mechanical farm equipment, the great saving of time in wheat production is emphasized by comparative figures. Department of Labor figures are quoted to show that years ago when the old hand methods of wheat production were in use more than three hours of labor were required to produce a bushel of grain. Today in many sections, according to the Department, less than 10 minutes are required. According to the report, in 1850 the average agricultural worker cared for about 12 acres of crops, whereas the average worker in the United States today cares for 34 acres, which is far from the maximum. In some instances agricultural workers now care for as much as 300 acres. This great saving of labor is, of course, due largely to the adoption of machines, and partly to improved methods of farm management. In 1850 there were only 7,220 laborers employed in the manufacture of

agricultural implements, whereas in 1920 there were more than 54,000. It is pointed out that there is much room for improvement in reducing hand labor in such crops as cotton and sugar beets.

Vitamins Make Hatchable Eggs

The poultry department of Ohio State University tried feeding pullets on a synthetic diet. They found the birds thrived on it and and laid eggs, but the eggs didn't hatch. From the time they were hatched these pullets were fed so-called purified foods. They got no corn or other grains, no milk nor grass, and probably no bugs or weed seeds. They got a mixture made up of starch, casein, and purified vegetable oil (crisco), salt mixture, cod liver oil, yeast, and agar (a product made from seaweed). It is thought that the lack of hatchability in the eggs is due to a lack of vitamin E, which regulates reproduction. The egg shells appeared normal, but the yolks were practically colorless, and the whites watery.

Yellow Corn Better for Pigs

For many years some farmers have considered yellow corn a better feed for pigs than white corn, and it appears they have been right. The University of Illinois conducted experiments which show the inferiority of white corn, and also demonstrated that the deficiency can be made up by using small amounts of alfalfa meal and cod liver oil. What the white corn lacks is vitamin A, a lack which is more disastrous to young pigs than to older hogs. When pigs from sows which have been kept on the white corn ration are put on the same kind of corn after weaning they grow very little. If these pigs are kept on a ration containing plenty of vitamin A, they can then put on a gain of 100 to 125 pounds on white corn, as they have enough of the vitamin stored in their bodies to make up the lack for that period. It is said that brood sows raised on well-balanced rations may withstand the effect of vitamin deficiency in white corn for two gestation and lactation periods, but that eventually their fertility is impaired.

Windmill Week

In many parts of the country much of the work formerly done by the windmill is now being done by the gas-engine or the electric motor, but wind is still a cheap power and in some sections it is not being used to anywhere near the extent it should be. Recognizing this fact, the Alabama Polytechnic Institute has arranged to advertise the good qualities of the windmill by holding a "Windmill Week," July 11 to 16. The particular idea is to increase the use of this power for pumping water for the home and for livestock. Wind is said to be the cheapest power in that State for pumping water, as the only expense of operation is a little oil, and winds are fairly dependable.

Paint Remover from Factory Waste

Chemists of the Bureau of Chemistry, Department of Agriculture, have developed a new kind of paint and varnish remover which is made from a by-product of the process of making paper pulp from wood. The oil from which the new product is made was formerly wasted, and the total amount produced in the United States is estimated from 750,000 to 2,000,000 gallons a year. The new chemical is applied to the painted or varnished surface, and after three to five minutes the paint or varnish can be easily scraped off. The patent on the process of making this material is a public service patent, which makes it possible for anyone to make and use the remover.

Foreign and International Agriculture

The purpose of this department is to help us understand the scientific, practical, and industrial agriculture of other countries and the international developments which result. The editor believes that such knowledge is now of the greatest importance in our agricultural prosperity. Every care is taken to insure accuracy—both of facts and their interpretation.

Fertilizers *for* Tropical Plants

¶ Another interesting abstract from "Fertilizer Requirements of Tropical Plants and Soils" by Dr. A. Jacob and V. Coyle, M. Sc.

THE luxuriance of the growth of tropical plants has given rise to the belief that tropical soils must be especially fertile, but unfortunately for the planter this is hardly the truth.

The luxuriance of tropical growth is due not so much to the soil, as to the climatic conditions of sunlight, humidity, and temperature. In temperate regions, the climate is usually the limiting factor in crop production, whereas in tropical regions the soil is very often the limiting factor. Generally speaking, soils in the tropics are in no way better than those of temperate zones; as a matter of fact, they are often poorer as a consequence of their peculiar mode of formation.

Let us consider the difference in the formation of these two classes of soil.

In the colder climates, mechanical disintegration, chiefly by frost, plays the most important part in the decay of rocks to form soil, whereas in the tropics this chief factor of frost is absent and mechanical breaking down is of less importance. On the other hand, in the tropics chemical decomposition of the soil is of much greater importance on account of the greater humidity and higher temperatures, which, as is known, accelerate chemical reactions generally. As a result of this rapid decomposition we often find that there remain no undecomposed reserves from which can be drawn further supplies of plant foods.

We see that tropical soils in general will be poorer in silica and above all in alkali, which is of great importance since potash is so essential a plant food. That climatic conditions are a determining factor in the composition of tropical soils, is one reason why we find here a certain uniformity, whereas in temperate regions a variation in the composition of the original rock will lead to a great difference in the soil to which it gives rise. Naturally there must also be differences between tropical soils, because these may be in various stages of decomposition.

Soils may often be found still rich in nitrogen, but we may be

quite certain that it is in a form not easily available to the plant, and in any case experiments carried out on such soils show a marked effect from the application of nitrogen; similarly for phosphoric acid and potash. Generally speaking, however, we must reckon with the fact that a lower potash content will be a characteristic of many tropical soils, at least of primary sedentary soils.

In alluvial soils formed in valleys from material transported from higher levels, or in alluvial soils deposited by river action in lowlands, one might expect a higher content of potash; nevertheless, although this expectation is often confirmed, these transported soils are also frequently deficient in potash.

A further complication in regard to the latter class of soil is the question of the influence of irrigation. On irrigated lands not only is the plant food content of the soil of importance, but also the plant food content of the water, and of the suspended or transported matter carried with it.

Two possibilities must be considered: irrigation with water (containing much suspended matter) may either augment the plant food content of the soil, thus giving a certain manuring, which however, must not be overrated (as potash and phosphoric acid contained in it are not very soluble), or on the other hand the content of the water may be less than that of the soil, in which case much of the plant food, especially the soil potash, will be dissolved by the water until an equilibrium of solution be established. In this latter case irrigation will exhaust the soil chiefly of potash.

Whatever the soil composition may be, the question as to whether a sufficiency of available plant food is present can never be answered by theorizing nor will a chemical analysis be of any great help, because at present there is no method which shows to what extent the plant food in the soil is available to any particular crop*. The only way by which a correct answer, in any specific case, can be got, is to lay out an exact manurial experiment, a method which at the same time has the advantage that it is a direct reply from the plant itself, as to whether nitrogen, phosphoric acid or potash or a complete dressing of all three is required.

*The method of Professor Neubauer claims to be able to find out how much phosphoric acid and potash are present in a soil, in a form available to the plant. In this method, 100 rye grains are sown in a glass containing a mixture of 100 grm of soil with 500 grm of sand. After about a fortnight, the quantities of phosphoric acid and potash contained in the plants are determined; the control being a vessel in which rye is sown in pure sand. Thus the plants themselves are used as indicators for the food content of the soil. The results of this analysis agree well with the results of field experiments; it, therefore, would be interesting, if a corresponding method could be found for tropical conditions.

• • •

Sold: A Plan of Soil Improvement

(*From page* 8)

that there were no points thrown in for bulk or balance. Every point was well considered and an essential part of the whole.

To put across such a program in anything short of a generation called for the employment of methods whereby whole communities, not merely individuals or small groups, might be reached and moved to action. The methods employed are familiar to many and may be classed under the heads of publicity, meetings, demonstrations,

development of local leaders, contests, and exhibits. The details of these "methods" are not so familiar, however, and account in part for the success of the campaign.

Almost every sort of publicity was used to gain attention to and interest in the plan. Newspaper articles, circular letters, posters, hand bills, road signs, "candidate cards," and crop-growing direction sheets gave the people little chance to lose sight of what was under way. I am not sure that paid advertisements were not employed. At any rate, the "power of the press" did much to set going, and keep going, the wheels that carried the load forward.

THERE are farm meetings—and farm meetings. In this Missouri county there were many conferences or small meetings which only leaders attended but when it came time to start the "sales campaign" two big all-day meetings were held in different parts of the county. A truck load of exhibit material was sent by the Missouri Agricultural Extension Service and accompanying it were P. F. Schowengerdt, soils specialist, and C. E. Carter, crop specialist, from the college. The speakers and the exhibits were the main attractions for these "whoop 'er up" meetings which were given the more dignified and exact title of "Clover and Prosperity Days." Almost a thousand persons attended these two initiatory sessions.

The enthusiasm thus aroused was not permitted to cool. Interest in the work was everywhere manifested and it was obvious that the time was ripe for organized action. To secure this action a county-wide "Clover and Prosperity" conference was arranged and the Honorable Lawrence County Court officially appointed the best farmer from each of the 96 school districts to serve as the authorized delegate from his district. Whether the fear of disobeying a court order was a factor in the success of the conference will never be known. Yes or no, attendance was nearly perfect. Business—and lots of it—was transacted. So much so, in fact, that when the conference adjourned it had gone on record in the form of an 11-point resolution covering the job at hand and the means of getting it done.

And right here was one of the

Small limestone crushers were installed in communities not served by railroads. A pulverizing demonstration is being staged in the above photograph

master strokes of the whole program. These resolutions came from the floor—from the farmers themselves—and not from the county agent or the college! Without a doubt the points considered were identical with those the extension workers would have proposed, but they were submitted, discussed, and approved by the people who were to carry them out; the job was theirs and they assumed responsibility for its proper execution. How many similar resolutions have fallen short of any noteworthy degree of accomplishment because of failure to recognize the value of "self-determination" in shaping the policy?

Then followed a year of intense educational work, with the employment of publicity, meetings, and demonstrations. At the end of this time another county-wide conference was called.

This time the attendance included 87 school district delegates, 50 junior delegates and 63 visitors. At this conference reports were called for from delegates who had volunteered at the preceding one to conduct "high type" soils and crops demonstrations by scientific methods. These reports, or "testimonials," showed the success of the soil-building practices recommended and further strengthened the convictions of the delegates. Instead of resolutions, definite "goals" were set as marks to shoot at in securing wide adoption of the approved practices.

The field demonstrations in this program were very much different from those so often conducted. In Klemme's own words,

"The ordinarily accepted idea of a demonstration is to demonstrate some simple, single treatment such as the use of lime in the production of clover. The fallacy and uncertainty of such a plan for Lawrence county is apparent when it is realized that most of the soils in the county require more than a single treatment for successful crop production."

In other words, if lime, inoculation and fertility are necessary, why demonstrate only one at a time and assume the high risk of failure because of the omission of the other practices? The Missouri "high type" demonstration requires that every factor for success be met in order to demonstrate beyond doubt that the crop can be successfully grown.

Local leadership played a highly important part in the rapid development of the soils program. Through local leaders the county agent was able to multiply his efforts many times in projecting the work into the many communities.

"The development of local leadership is extremely important because the only way in which farmers may be helped permanently is to teach a few how to help themselves and their neighbors," Klemme writes. *"One leader was selected for each of the 96 school districts. The official county court appointment served to notify the prospective leader in a dignified and impressive manner of his selection as the representative of his school district, whose privilege and duty it would be to help develop a soil improvement program for his county."*

The individual farmer, once he became convinced that the thing was right, was not permitted to stop short of actually putting it into practice.

"Through long continued efforts, we attract attention, arouse interest, and create desire. Apparently the farmer is ready to change his practice, but he fails to act. He does not know where to get the needed lime or fertilizer, good seed or inoculation," Klemme observes.

In this program the "breakdown" in the final lap was prevented by

(*Turn to page* 47)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

It is not only the amount of nitrogen in the soil that is a big factor in deciding the crop yield; it is also the time at which the nitrogen becomes available, especially in the spring.

The amount of available nitrogen in the soil is particularly affected by plowing under green manuring crops. It has been found that to obtain the greatest fertilizing value of sweet clover, the time of plowing it is an important consideration. This work is discussed fully in Bulletin No. 285 of the Illinois Experiment Station, "Experiments in Handling Sweet Clover," by Albert L. Whiting and Thomas E. Richmond. The bull tin gives the results of a number of experiments made in different parts of Illinois on the development of nitrate nitrogen in the soil through the decomposition of sweet clover plowed under at different times of the year. Any one interested in this crop for building up fertility of the soil should obtain a copy.

The cost of production of cotton is important. The inroads made by diseases increase the cost of production. It is, therefore, very gratifying to note that potash has had a very decided influence in controlling the cotton wilt and rust on the experimental plots of the South Mississippi Experiment Station. Quoting from a report made by Director Ferris, Cir. 69 "Cotton Experiments, 1926," it is noted that "The plat where potash has been left out during all these years went very largely to pieces in 1926 as a result of wilt. No replications were used. We have enlisted the help of bacteriologists at the A. & M. College in continuing this work." Undoubtedly there is a big field of promising work on the role of potash in controlling diseases, particularly cotton wilt.

"Report South Mississippi Branch Experiment Station," Agricultural Experiment Station, A. & M. College, Mississippi, Bulletin No. 238, December, 1926, E. B. Ferris and W. S. Anderson.

"Cotton Fertilizers and Varieties (Central Station)," Agricultural Experiment Station, A. & M. College, Mississippi, Bulletin No. 241, December, 1926, J. F. O'Kelly, C. B. Anders, and W. W. Hull.

"The Availability of Phosphates in Calcareous or Alkaline Soils," Agricultural Experiment Station, University of Arizona, Tucson, Ariz., Tech. Bul. 10, June 1, 1926, J. F. Breazeale and P. S. Burgess.

"Alkali Tolerance of Plants Considered as a Phenomenon of Adaptation," Agricultural Experiment Station, University of Arizona, Tucson, Ariz., Tech. Bul. 11, Nov. 1, 1926, J. F. Breazeale.

"Fertilizer Experiments with Greenhouse Lettuce and Tomatoes," Agricultural Experiment Station, University of Illinois, Urbana, Ill., Bul. 286, Feb., 1927, J. W. Lloyd.

"Commercial Fertilizers for 1927," University of Maryland, College Park, Md., Control Series, No. 120, Jan., 1927, N. E. Gordon and L. E. Bopst.

"Inspection of Lime Products Used in Agriculture," Agricultural Experiment Station, Amherst, Mass., Control Series, Bul. 38, Dec., 1926, H. D. Haskins, L. S. Walker and M. W. Goodwin.

"Inspection of Commercial Fertilizers for 1926," Agricultural Experiment Station, University of New Hampshire, Durham, N. H., Bul. 225, Oct., 1926, T. G. Phillips, T. O. Smith and A. W. Petre.

Crops

In line with the usual trend of

agricultural thought at this season of the year, the greater number of bulletins which have come to our desk this month pertain to crops. Selecting two which may be of more universal interest, we mention first, Bul. 287, "Spring Wheat Production in Illinois," which has been prepared by Robert W. Stark. This investigator sets forth sound information on varieties, rate and date of seeding, and culture.

The other bulletin deals with "The Oat Crop," and is written by C. A. Mooers, Director and Agronomist of the Agricultural Experiment Station at Knoxville, Tenn. This is Bul. 136. Among Director Mooers' other conclusions are the facts that spring oats fit into the average cropping system much better than winter oats, and that fertilizer can be used profitably for the oat crop, but regard should be had for the soil needs. Directions for the use of fertilizers under various conditions are given.

"Propagation of the Date Palm, with Particular Reference to the Rooting of High Offshoots," Agricultural Experiment Station, University of Arizona, Tucson, Ariz., Bul. 115, Sept. 1, 1926, F. J. Crider.

"Watermelon Culture," Agricultural Experiment Station, University of Arizona, Tucson, Ariz., No. 156, Nov. 1, 1926, M. F. Wharton.

"Fruit Tree and Orchard Judging," Agricultural Experiment Station, University of California, Berkeley, Cal., Cir. 309, Feb., 1927, Willis P. Duruz.

"Production Practices in New Hampshire Orchards," Extension Service, University of New Hampshire, Durham, N. H., Ext. Cir. 62, May, 1926, H. A. Rollins.

"Roses," Mississippi Agricultural Experiment Station, A. & M. College, Miss., Cir. 70, Jan., 1927, J. C. C. Price.

"The Immediate Effect of Gametic Relationship and of Parental Type Upon the Kernel Weight of Corn," Agricultural Experiment Station, University of Nebraska, Lincoln, Neb., Research Bul. 33, Dec., 1926, T. A. Kiesselbach.

"Worn-Out Hay Lands," Extension Service, University of New Hampshire, Durham, N. H., Ext. Cir. 65, Jan., 1927, Ford S. Prince.

"The North Dakota Farm Program for 1927," Agricultural Extension Division, North Dakota Agricultural College, Fargo, N. D., Cir. 74, Feb., 1927.

"Sunshine Sweet Corn," Agricultural Experiment Station, North Dakota Agricultural College, Fargo, N. D., Bul. 205, Feb., 1927, A. F. Yeager.

"Experiments with Certified Irish Cobbler Potatoes," Agricultural Experiment Station of Clemson College, Clemson College, S. C., Bul. 232, Dec., 1926, A. M. Musser.

"Johnson Grass in Texas," Texas Agricultural Experiment Station, A. & M. College of Texas, College Station, Texas, Cir. 43, Feb., 1927, E. O. Pollock.

"Abstracts of Bulletins 328-346 and Circulars 32-42," Texas Agricultural Experiment Station, A. & M. College of Texas, College Station, Texas, Cir. 44, Mar., 1927, A. D. Jackson.

"Texas Agricultural Outlook for 1927," Texas Agricultural Experiment Station, A. & M. College of Texas, College Station, Texas, Cir. 45, Mar., 1927, L. P. Gabbard.

"Variation in Certain Lint Characters in a Cotton Plant and Its Progeny," Texas Agricultural Experiment Station, A. & M. College of Texas, College Station, Texas, Bul. 349, Feb., 1927, E. P. Humbert and J. S. Mogford.

"American Potato Journal," Washington, D. C., Vol. IV, No. 2, Feb., 1927, H. R. Smalley.

"Report for the Fiscal Year Ending June 30, 1926," Agricultural Experiment Station, University of Florida, Gainesville, Fla.

"Annual Report of the Director 1924-26," Agricultural Experiment Station, University of Wisconsin, Madison, Wis.

"Classified List of Projects of the Agricultural Experiment Stations 1925-26," U. S. D. A., Washington, D. C., E. W. Allen, Chief.

Economics

"Farm Economics," Alabama Polytechnic Institute, Auburn, Ala., Vol. II, Nos. 5 and 6.

"The Trend Toward a More Effective Use of the Land as Shown by the Yield per Acre of Certain Crops," U. S. D. A., Dept. Bul. 1458, Bernard O. Weitz.

Diseases

"The Differential Reaction of Strains Within a Variety of Wheat to Physiologic Forms of Puccinia Graminis Tritici," Agricultural Experiment Station, University of Nebraska, Lincoln, Neb., Research Bul. 39, Dec., 1926. T. A. Kiesselbach and George L. Peltier.

"Control of Smuts on Cereal Crops," Agricultural Extension Division, North Dakota Agricultural College, Fargo, N. D., Cir. 75, Feb., 1927, H. L. Bolley.

"Studies on the Nature of Wilt Resistance in Flax," Agricultural Experiment Station, North Dakota Agricultural College, Fargo, N. D., Bul. 202, Sept., 1926, Casper I. Nelson and Mayme Dworak.

Insects

"The Striped Cucumber Beetle," Agricultural Experiment Station, University of Arkansas, Fayetteville, Ark., Bul. 216, Feb., 1927, Dwight Isely.

"Citrus Insects and Their Control," Agricultural Experiment Station, University of Florida, Gainesville, Fla., Bul. 183, June, 1926, J. R. Watson.

Sold: A Plan of Soil Improvement

(*From page* 44)

securing the cooperation of business concerns which provided dependable and economical sources for the needed supplies. These agencies included limestone producers, seed dealers, railway companies, fertilizer dealers, and all others concerned with the transportation, storage, and sale of the necessary materials — limestone, fertilizer, seed, and inoculation.

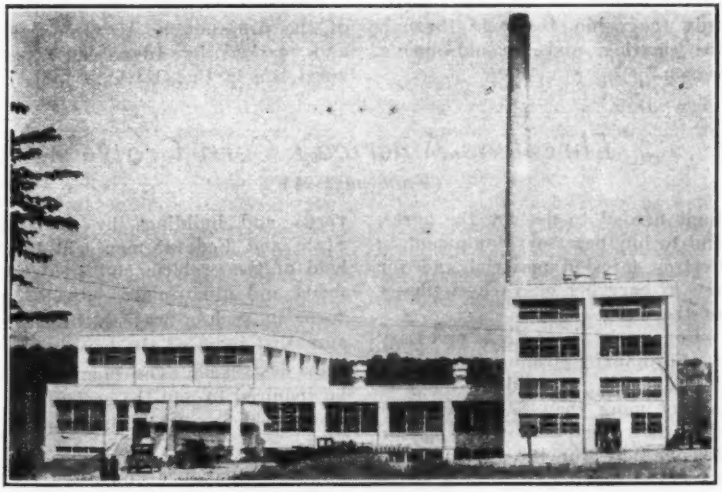
The sizing-up of the soil problem and the plan of attack employed in this country seem exceptionally good. But, after all, it is results we want and results must be the measuring stick of achievement. When applied to this Ozark plan of soil improvement, a high degree of success is registered. Here are a few of the tangible and measurable results:

Legume acreage greatly increased; alfalfa, 370 per cent; soybeans, 2,750 per cent; cowpeas, 460 per cent, between 1921 and 1926, according to official crop reporting service. Only 124 acres of sweet clover in 1924; more than 2,000 acres of this legume seeded in spring of 1926.

Limestone use increased from 200 tons in 1924, to 4,400 tons in 1925, and over 6,000 tons in the first nine months of 1926; lime storage facilities at four of the eight shipping points; three portable lime crushers for communities not reached by railroads.

Fertilizer use greatly improved, both in total tonnage and analysis; only 30 tons of low analysis fertilizer used in 1926 compared to 472 tons in 1920; wheat and clover seedings now adequately fertilized and with great benefit to clover as well as grain; fruit and vegetable crops now more properly fertilized; 70,000 tons more livestock manure now available because of greater dairy cow population.

An increase of 5,250 dairy cows



The $250,000 milk condensery—the only one in Missouri—now stands as a milestone to mark the progress of farm life in Lawrence county as effected by the dairy farming and soil improvement program

in four years—all of them better fed than before; a milk condensery—the only one in Missouri; three actively functioning cow-testing associations.

Soil erosion is being reduced by taking out of cultivation much unsuited land, by seeding down of such land, by use of rye and oats as cover crops, and by greatly extending the acreage of legume crops.

The greatest, but least measurable of the results of the soil improvement program in Lawrence county is the effect on the people themselves. Active farm leaders have been developed as a direct result of the soil fertility campaign; they have adopted the program as their own; they have had a part in developing it; and have accepted the responsibility to "carry on" in their respective communities. An atmosphere of optimism and progress pervades the county for the people now see their way to "growing concrete highways, modern homes, and motor cars out of the same soil that produced, in its virgin state, only the cabin, the road through the clearing, and the old spring wagon."

It isn't necessary, nor possible, to give any formula, or rule, to be followed in putting on—and putting across—a soil improvement program in a county or on a single farm. But, if one were required to do so, he could not do better than to follow the steps chosen in this book of soil gospel from the Ozarks, which already has shown an unusual and convincing degree of success for the undertaking. These steps are all "pro's," figuratively; they are "pro's," literally, for each favors the forward movement of the program toward its general adoption. They are, in logical and chronological order:

Profit—the people were given a vision of how, when, and where they would profit.

Problem—upon its proper analysis depended much of the success.

Program—devised to solve existing needs and begun at the bottom—the soil, itself.

Proof—demonstrating that the program would work, and at a profit.

Progress—measured by adoption of the program on a farm scale and marked by advancement of rural life in the Ozarks.

* * *

Threatens America's Corn Crop

(*From page 24*)

tions needed to destroy the borer, and to buy necessary equipment to destroy infested material and for use in carrying on various phases of the work.

For work above that necessary for ordinary farming operations farmers will be paid at the rate of not more than $2 an acre for field corn land and not to exceed $1 per acre for the treatment of sweet corn land. If farmers in the specified region do not clean up their fields and destroy stalks, cobs, and other material about the yards and buildings by May 1, State and Federal men will take hold of the problem and treat the fields and other places about the farm in such a way as to make sure that most of the borers have been destroyed. The farmers will be required to pay the cost of this work, which will be included in taxes.

The campaign is under the general direction of Dr. A. F. Woods, Director of Scientific Work, Department of Agriculture.

Better Grains and Hays

(*From page* 18)

tilizers. This all means that a better quality wheat was produced steadily year after year. The grade was more stabilized. The variation in grade was reduced from 103 per cent to 5 per cent by using the right fertilizers.

Phosphate and potash used together were the outstanding combination of any two materials that improved quality. When nitrogen was added, there was a further improvement. But in these tests potash had the most marked effect in improving the grade.

In the middle western area, in Ohio, it also was found that phosphate and potash together gave a heavier test weight than any other combination of two ingredients. Nitrogen, in addition, slightly increased the test weight.

Why not add an extra value to each bushel, as well as extra bushels to each acre?

The above experiments, East and West, show that well-balanced fertilizers will do this. Aim for a high test weight. Study the analysis on every bag of fertilizer you buy. Look especially at the phosphate and potash percentages. A low potash percentage means a low grade wheat and small returns. The most suitable analyses are given on a page following the discussion on the fertilizer needs of clover, because small grains—wheat, oats, rye, and barley—usually are grown in a rotation with legumes and the fertilizers often are applied for both crops at the same time.

AMONG the most important legumes is medium red clover, usually grown with grasses on nearly every grain farm from the Atlantic to the Mississippi river.

Why? Because medium red clover and other legumes have two high values, feeding and fertilizing. They put feed in the barn and nitrogen in the soil. Medium red clover is one of the most important crops for keeping up the fertility of our farms.

But, as pointed out by the U. S. Department of Agriculture, a most serious problem confronting the American farmer today, is the difficulty in obtaining and maintaining a good stand of clover.

Authorities have emphasized many things. Liming, good seed suited to the climate where the legume is grown, inoculation, and thorough preparation of the seed bed are among the more important. They are all essential, but none of these things, nor all put together, will produce the clover or other legumes that should be grown in the grain-growing regions east of the Mississippi river.

What is needed in addition is the proper use of the right fertilizers. Of the three ingredients, phosphate and potash are of outstanding importance for clover and all legumes. But the brother that up to the present has not worked hard enough, is potash.

"Clover is 'potash-loving' as well as 'lime-loving.'" Without potash, clover will not make a good stand. This is shown by the results of fertilizer experiments published by H. J. Snyder, of the University of Illinois, in The Prairie Farmer, of March 12, 1927. The author points out, "On the very best of our farm lands, clover failures are frequent and clover crops which are short and low in yield are common occurrences." He has found, as a result of field experiments conducted in different parts of Illinois, that on the best corn land in

the Illinois corn belt a fertilizer treatment consisting of manure, limestone, phosphate, and potash increased the yield of mixed clover hay from 2,100 pounds to 4,000 pounds per acre. In most of the field tests the best yield was obtained when potash was added, in addition to lime, phosphate, and manure.

Investigations of the fertilizer needs of clovers and other legumes also have been carried on by Professor E. Truog, University of Wisconsin. As a result of this work, Professor Truog gives the following practical advice: "The importance of potash fertilization for alfalfa, clover, and other legumes is as yet not fully appreciated in this country. Many failures with alfalfa and clover are due to a lack of available potash. The importance of lime and phosphate has been quite fully emphasized. The same cannot, however, be said in regard to potash. Few people realize that alfalfa and clover hay contain as much potash as they do lime. A ton of alfalfa or clover hay requires as much potash as there is in 75 pounds of muriate of potash. Is it any wonder that alfalfa and clover often suffer because of a lack of available potash? It should be emphasized that alfalfa, clover, and most legumes are 'potash-loving' as well as 'lime-loving.'"

The above recommendations are confirmed by the results of field trials made at the Delaware Agricultural Experiment Station. For instance, when nitrogen and phosphate only were applied to the wheat in which the clover was seeded, the increase in yield of clover that followed the wheat was only 409 pounds per acre. When 120 pounds of muriate of potash were added to the same mixture, the increase in yield of clover was 2,130 pounds per acre. This means that the potash increased the yield of clover from 409 pounds to 2,130 pounds, or 1,721 pounds per acre. This proves the need for potash on these soils to produce good crops of clover hay.

In Connecticut also, experiments have shown the value of potash in addition to phosphate for increasing the yield of alfalfa. For instance, results published by the Storrs Experiment Station show that 140 pounds of actual phosphate per acre produced an average yield of 4.11 tons of alfalfa

Courtesy Mass. Exp. Sta.

Neglected meadows—no fertilizer treatment—note poor growth and weeds

per acre, but 70 pounds of actual potash in addition to the above, increased the yield to 5.26 tons per acre. In other words, potash, equivalent to 140 pounds muriate of potash per acre and costing about $2.80, increased the yield by one ton of alfalfa per acre. What is a ton of alfalfa worth on your farm? What would you have to pay if you bought it?

Thus, fertilizers save the feed bills. And potash is very necessary in such fertilizers if the highest yield and the best quality grains and best yield of legumes are to be obtained. See that this brother does not shirk his work and don't forget that all three brothers—nitrogen, phosphate, and potash—must be together and work together.

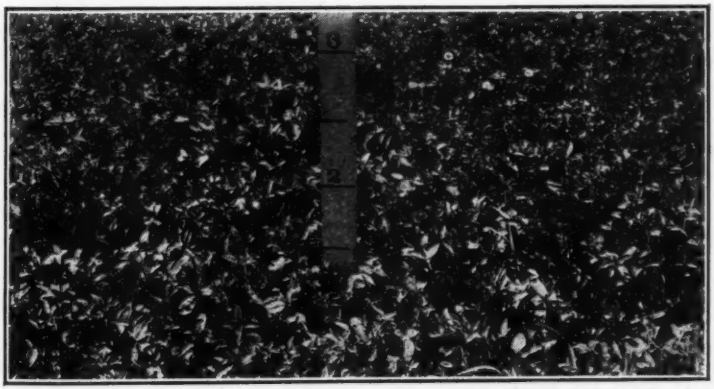
NOW the farmer will ask, "What fertilizer and how much per acre should be used for small grains and clover?"

Wheat is the most important grain on which fertilizers are used, and as clover is usually seeded with wheat, the fertilizers must suit the needs of the two crops, wheat and mixed clover hay.

The best analysis to use is decided largely by the type of soil and the amount of manure used. Fertilizer recommendations for wheat followed by clover, based on the soil type and amount of manure used, are given in two tables on pages 52-53. These tables are for the two chief wheat-growing areas east of the Mississippi river.

There are six other practical points to remember when deciding on the right analysis.

1. Many fertilizer materials have a lasting effect; they increase the yield of the crop that follows, as well as the crop on which they are used. Therefore, plan for the rotation as a whole and not for a single crop alone. Do not forget the clover. Use a high analysis fertilizer on wheat in order to get a good crop of both wheat and mixed clover hay. The fertilizer requirements of oats, barley, and rye, especially when followed by mixed clover hay, are about the same as for wheat. On the other hand, if these crops follow well manured and fertilized crops, such as potatoes, on which large quantities of fertilizers have been used, the residues of such fertilizers may



Courtesy Mass. Exp. Sta.

The use of phosphoric acid and potash brought back the clover and crowded out the weeds

be sufficient for the grain crop. The place of manure in the rotation is important.

2. When farm manure is available, it is wasteful to apply a large amount preceding clover or alfalfa, because the nitrogen in the manure is largely wasted. It is more profitable to use a lighter dressing of manure and, in addition, a mixed fertilizer that contains a high percentage of phosphate and potash. The manure should be applied previous to plowing for corn or other non-legume crops.

3. Use fertilizers properly balanced with the right percentage of each plant food. The continued use of phosphate alone or fertilizers high in phosphate may increase the wheat and hay yield for a few years, but the increase in yield takes out of the soil nitrogen and potash, as well as phosphate, and thus tends to exhaust the soil of available potash. As a result of such one-sided fertilization, lower yields, poorer quality grain, and diseases due to potash starvation follow.

4. Potash starvation in clover is shown by the appearance of yellow to brown spots which develop around the border of the leaf and usually form a more or less definite pattern. Later on, spots develop towards the center, and the border becomes yellow, curls down, and dries up. The spots always appear on the older leaves. Spots caused by insects should not be confused with potash starvation. Similar spots appear on alfalfa, except that instead of being yellow to brown, they are white.

5. Enrich the soil with nitrogen from the use of legumes and well kept manure. But it often pays to buy some nitrogen in complete mixed fertilizers for wheat and special cash crops in the rotation.

6. Top-dressing hay fields and pastures is often a profitable practice. On alfalfa fields, hay fields in which clover is seeded, and pas-

FERTILIZER ANALYSES RECOMMENDED

For the Eastern Wheat Area (Pa., Md., Del., Va., and W. Va.)
For Wheat, When Followed by Clover Hay

Soils	Manure		Per Cent		
			Nitrogen	Phosphoric Acid	Potash
Light Colored Soils *Clay Loams and Clays*	With	Without	2—4 0—2	8—10 8—12	4—6 0—4
Medium Loams and Sandy Loams	With	Without	2—6 2	8—10 8—12	5—10 4—8
Dark Colored Soils *Loams*	With	Without	2—3 0—2	8—10 8—12	4—6 2—4

Apply 250-600 pounds per acre.

On loams and lighter soils some of this fertilizer may be applied as a spring top-dressing, especially where the larger amounts of nitrogen are used. In cases of heavy winter and spring rainfalls, use top-dressing in spring, particularly on light loam soils. Use fertilizer when wheat is in the tillering or stooling stage, and apply only when the leaves of the plants are dry. On clay soils use 50-100 pounds nitrate of soda or sulfate of ammonia, on medium loams 150-200 pounds of a 4-10-4, and on sandy loams 150-300 pounds of a 6-8-4.

tures, fertilizer mixtures containing little, if any, nitrogen, and high in phosphate and potash, should be used. Analyses such as 0-10-10, 0-8-10, and 2-8-10 are best suited for this purpose. Pastures on thin, dry soils or acid soils, do not respond to top-dressing as quickly as pastures on soils well supplied with moisture and lime.

Many fields in the hay and pasture belt are not plowed for several years. Such fields are often in timothy and other grasses with little or no clover. Grasses demand nitrogen, therefore, on such fields when in good physical condition and not sod-bound, it is often profitable to apply complete mixed fertilizers high in nitrogen as, for instance, the analysis 7-6-5. About 500 pounds per acre should be used.

In many states there is a tendency to use a larger tonnage of the higher potash goods. In Ohio, for instance, the consumption of 10 per cent potash fertilizers has increased considerably within the last few years. In Indiana, there is a strong tendency to use more of the 2-12-6 and 2-16-8 analysis fertilizers. Much of these higher analysis fertilizers can well be used on small grains and legumes. They will profitably produce a higher grade and better quality of wheat, a better stand of clover and other legumes, increase the cash returns from grain crops, save feed bills, and add fertility to the soil.

* * *

FERTILIZER ANALYSES RECOMMENDED

*For the Middle Western Wheat Area East of Mississippi River**
For Wheat, When Followed by Clover Hay

Soils	Manure		Per Cent		
			Nitrogen	Phosphoric Acid	Potash
Light Colored Soils		Without	2—4	8—12	2—4
Clay Loams and Clays	With		0—2	10—16	0—2
Medium Loams and Sandy Loams		Without	2—6	8—12	4—8
	With		2	10—12	4—6
Dark Colored Soils		Without	0—2	10—16	0—2
Heavy Loams and Clays	With		0	16—	0
Medium Loams and Sandy Loams		Without	2—3	10—12	4—6
	With		0—2	10—16	2—4

Apply 250-400 pounds per acre.

(* Indiana, Illinois, Ohio, and adjacent territory)

Placing the Blame for Surpluses

(*From page* 21)

ment of crop enterprises to probable market needs. As for the idea that prices in the planting season are a guide in production, there isn't a farmer in the country who hasn't found it treacherous.

They stick to it because, as yet, they haven't acquired confidence in the newer and better system of basing acreage on *forecasts of demand.* Farmers adjust their acreage to past prices, because they think no one can tell what future prices will be. They know from bitter experience, however, that adjusting acreage to past prices results in *overadjustment,* first one way and then the other.

Our cotton acreage, for example, has been steadily increased, in spite of warnings, from 30,509,000 acres in 1921 to an estimated 47,207,000 in 1926. It has been increased each spring because cotton prices the preceding fall were profitable. There is probably not a farmer in the cotton belt who doesn't know that high prices can't be relied on to stay put. But the growers take past prices as their guide because they don't know what else to do.

This system results in continuous compensating overadjustments. High prices invariably induce expansion and low prices contraction of acreage, *with a movement greater each way than the preceding price movement.* This fatal peculiarity of our cropping system has been studied statistically in the case of cotton for the period 1904 to 1924. The study shows, as B. B. Smith puts it, "that sufficient acreage adjustment was usually made each year to change profitable growing to unprofitable, or vice versa, unprofitable to profitable."

YEARS of acreage increases are followed by years of decreases and years of decreases by increases, except in abnormal times like those of the last few years when the expansion or contraction process runs through a longer cycle. You have chronic overdoing of the thing in each direction.

Is it hopeless to hope for a cure? Not at all. We simply need a closer alliance of economic science

Great efficiency on the part of tobacco cooperatives has not prevented losses from overproduction

with practical farming.

It is no longer true that farmers have no guide as to how much of any particular crop they should aim to produce. They don't need to act any more on the false assumption that the price paid for the last crop shows what the price will be for the next. There are now available government forecasts of demand, which in most cases are remarkably accurate. Secretary of Agriculture Jardine says in his annual report that more than 95 per cent of the forecasts given in the Department of Agriculture's outlook reports in 1925 and 1926 proved correct.

These reports can be acted on by farmers individually and also collectively. Those who act on them individually will be less often caught without stocks when prices are high, and with excessive stocks on hand when prices are low. Collective action on demand forecasts will flatten out the hills and valleys of production and stabilize prices.

THE opportunity for self-help in this way is so obvious and promising that we haven't any justification for regarding the surplus problem as purely one of marketing. Any plan that relieved farmers of their surpluses without restraining them from raising additional surpluses would soon break down. It is useless to talk about orderly marketing, without making some provision for orderly production. With acreage changes controlling nearly half the variation in the production of major crops, the assertion that surpluses are "the Lord's affair more than man's" is open to serious qualification.

Attention to acreage control can reduce the surplus problem to manageable proportions. And each farmer who adjusts his own acreage intelligently contributes to that result, while at the same time making special profits that the "overadjusters" will miss. Until acreage regulation on a sensible basis becomes general, smart farmers will have a neat opportunity to make money by keeping out of unintelligent mass swings in production. An instance is given by the Department of Agriculture which would be more to the point in this article if it were about field crops. Still, there is a lesson for farmers in this story of how three farmers behaved in relation to the hog cycle.

One man went with the crowd. He expanded his production when prices were high and cut it down when prices were low. All he made was an average annual labor income of about $60. The second hog raiser made no attempt to call the turns of the market, but kept his production on an even keel. His average annual labor income from hogs was approximately $1,380. The third man anticipated the trend of prices, instead of trailing along after it. When others were expanding their production, he cut his production down. On the other hand, when the general run of producers were being frightened out of the game by low prices, he bred all the sows he could. This man made an average annual labor income of $1,620.

A pretty safe bet in market forecasts for the present at any rate is that the general mass of producers will repeat the errors of the past. That goes for field crops, as well as for the continuous maladjustment in production that we call the hog cycle. Economic science is turning its heavy artillery against the practice of regulating acreage by past prices, in the conviction that it is the root of the surplus problem. But this artillery needs infantry support from farmers who see the point.

Unbending Backs in Agriculture

(*From page* 11)

slides, to the bottom. As the horses pull the drill forward, the seed is poured into funnels, going from there down a series of tubes, finally dropping into shallow furrows which are traced by small disks traveling immediately in front of the streams of seeds.

The size of the drill is determined by the number of rows it will sow and by their distance apart. For ordinary farm work, it is advisable to buy a drill with at least nine furrow-openers, although a drill having 10 or 12 can be drawn on level land without difficulty. Grain drills in the United States ordinarily have the furrow-openers placed six, seven, or eight inches apart.

The steel-ribbon seed-tube is most lasting and best because it is not easily drawn out of shape and returns to shape if it does. Although the steel-wire seed-tube is very satisfactory, if it once becomes stretched it never resumes its original shape. The rubber seed-tube is satisfactory while it lasts, but is apt to break off at the top of the furrow-opener; it also has a tendency to clog.

The furrow-opener is the most important part of the drill, of which there are four types—the hoe, the shoe, the single-disk, and the double-disk. Although the hoe furrow-opener gives good penetration, it clogs easily. It forms a good furrow if the ground is not too hard, and it covers well, the earth falling in from either side. In a single-disk furrow-opener, a single disk is combined with a seed-tube. It is simpler and has better penetration than the other types, yet it leaves the ground somewhat uneven, as half of the furrow-openers are set to direct the soil in one direction, while the other half are set to direct it in the other direction in order to balance the machine. On ground that is covered with trash, such as in an old cornfield, the single-disk is the more efficient, because it is able to cut through many of the stalks and penetrates deeper. The double-disk furrow-opener has two disks, which results in smoother soil, although this disk does not have the penetration of the single-disk.

Much of the grain seeded in the United States is drilled on account of the more uniform distribution and covering of the seeds, more uniform depth of planting, uniform germination, greater speed of planting, and decrease in the amount of seed required. Through experiments made in various agricultural colleges, facts have been obtained to prove that drilling results in appreciably higher yields.

The story of our progress in farming equipment is the history of our progress as an American people, for the fifty-year mark defines the period in which American agriculture changes from hand to mechanical processes, thus distinguishing our agriculture from that of the old world.

Fifty years ago practically all of the grain raised was sown by hand, although drills and endgate seeders were being introduced. At that time one-horse, one-row drills were the most efficient sowing machinery upon the market, while at the present time we have seeding drills for all sizes and types, both horse and tractor drawn, with grass seed and fertilizer attachments.

Florida

(*From page* 28)

studying certain problems peculiar to the different sections.

The Station has had a depart-

ment of agronomy, as such, only since July 1, 1926, but its predecessor, the department of grass and forage crops, had been maintained for years. J. B. Thompson, now director of the Virgin Islands Experiment Station, was formerly head of this department. W. E. Stokes has been at the helm since 1921.

In cooperation with the Office of Forage Crop Investigations of the United States Department of Agriculture, the department of grass and forage crops has tried out hundreds upon hundreds of semi-tropical crops, and has helped to introduce many crops which have proved of great value to Florida and the Southeast. Three of these crops have been grasses—Bahia, Napier, and Centipede. These three grasses have proved to be well adapted to conditions in Florida and the Lower Atlantic Coastal Plain and Gulf Coastal Plain. Bahia and Centipede grasses are good pasture grasses, while Napier is used more for silage, soiling, and forage. Bahia was introduced around 1908 or 1909, Napier in 1913-15, and Centipede about 1918.

THE Florida Experiment Station is one of the few stations that have done any work with lawn and golf grasses. Lawn grass variety tests were started in 1922, as a result of the pasture grass studies. The golf grass work was started in 1923 in cooperation with the Green Section of the U. S. Golf Association. One hundred different plots are now under observation, covering both varieties and management.

Working with the Office of Forage Crop Investigations of the U. S. Department of Agriculture, the Florida Station has been instrumental in introducing a new leguminous summer cover crop for

John M. Scott
Vice-Director and Animal Industrialist of the Florida Agricultural Experiment Station

groves that bids fair to be of value to the entire Southeast, probably to Texas. The first extensive plantings of this crop—Crotalaria—were made in 1921, and since that time it has proved its merits. Crotalaria is a legume, makes a good growth, will reseed itself, and in Florida can be mowed twice in one summer, thus giving a large amount of green matter to turn back to the soil. Seed has been sent to the Tennessee Experiment Station and to a seed company at Hartsville, S. C., and the Crotalaria has matured there, a volunteer crop setting the second year in both places. Seed has been sent also to California and Mississippi for trial in citrus and pecan groves.

Another plant of value to the entire Southeast, a leguminous forage crop, was developed and spread largely through the efforts and work of the Florida Experiment Station. This crop is the

velvet bean. Thirty years ago the velvet bean was thought to be poisonous, and was grown only as an ornamental vine in parts of the state. Today it is one of the important field crops of the Southeast, its value each year running into millions of dollars. Prior to 1907 practically all of the work done on the velvet bean was done in Florida, this being the only State in which seed could be produced with certainty. After proving the value of the plant as a leguminous forage crop, the Station turned its attention to the development of early maturing varieties that would be suitable for other States. Other States also conducted work along this line, finding satisfactory varieties.

John M. Scott, animal industrialist of the Experiment Station, has done some work on soft pork which indicates that further work could well be done along this line. Hogs fed on peanuts and certain other oily feeds common in the South, grow into soft pork which is discriminated against by the packers. It was found that the melting point of the lard from certain hogs fed on peanuts varied. This suggested that it might be possible to breed for pork which would be hard, even though the hog had been fed on peanuts. This in turn necessitated the taking of fat samples from live hogs, for which a method was worked out by the Florida Station. Considerable variation between the fat from different hogs was found to exist, but the work was never carried to completion.

Florida, having a semi-tropical climate, is well adapted to numerous insects and diseases. Florida entomologists realize that natural control of insects, which is comparatively inexpensive, is to be preferred to artificial control, which is very expensive. Consequently efforts have been made to introduce and establish enemies of some of the worst insects. Notable among these efforts are those of Dr. E. W. Berger, formerly entomologist of the Experiment Station and now of the State Plant Board, in the control of citrus whitefly by entomogenous fungi. A method of growing the red whitefly-fungus, Red Aschersonia, was worked out in 1908 by H. S. Fawcett, plant pathologist, and the method of spreading this fungus in the grove was worked out by Dr. Berger. The fungus grows on the whitefly larvae and pupae and kills them, greatly aiding in control. Other fungi have been found which help control other whiteflies and several scale insects, and methods of growing and distributing the fungi on a large scale have been worked out by Dr. Berger. This work alone has been worth millions of dollars to Florida citrus growers.

Stem-end rot, scab, melanose, and gummosis are serious diseases of citrus which have been investigated and for which control methods have been worked out by the Experiment Station. H. S. Fawcett, one-time plant pathologist, did considerable work on these diseases. He described the cause of melanose, *Phomopsis citri* Fawcett, and it was named by him.

In 1913 a serious disease of citrus, citrus canker, was found to be in the State, and the Experiment Station set to work on it. H. E. Stevens, of the plant pathology staff, examined specimens of the disease which had been collected by Dr. E. W. Berger. In 1914 the disease assumed a serious aspect in Dade county, and it was then that systematic eradication by burning all infected trees was started. This was continued by the State Plant Board, after its creation, until finally the disease was entirely wiped out of the State.

Bayard F. Floyd, working at

the Florida Station from about 1908 to 1921, has made notable contributions to the study of a physiological disturbance in citrus known as exanthema or "dieback." Though failing to definitely define the cause of "dieback," Floyd did a great deal in the study of the symptoms of the trouble and impressed upon the growers the importance of the proper management of groves to prevent this rather prevalent physiological disturbance.

In 1909 the Florida Station installed a set of lysimeters or soil tanks for the purpose of studying the removal by leaching of plant nutrients from Florida soils. This was the second set of lysimeters installed in the United States, the first set having been installed at Cornell a few months earlier. Analyses of drainage waters from these tanks have emphasized the large losses of plant nutrients from Florida sandy soils, and pointed out the desirability of maintaining the fertility of such soils by growing cover crops and applying fertilizers. They have shown also the rapid nitrification of the nitrogen contained in soil organic matter and organic nitrogenous fertilizers, indicating the desirability of small and frequent applications of soluble nitrogen fertilizers. It has been found, however, that even sandy soils retain phosphate and potash well.

The Florida Station has been instrumental in the introduction of the tung-oil tree, brought from China by the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture. The seed of this tree contains tung-oil, a necessary ingredient in waterproof varnishes, and the paint and varnish industry has helped to get the tree established in the United States. China has been supplying the only tung-oil of commerce, and with unsettled conditions there, it is especially desirable to establish an American supply. The tree has made its best growth in the warm climate of central Florida, but it is growing also in other parts of the Gulf Coast territory.

* * *

The Long-Time Fertilizer Trend

(*From page* 23)

1915 (*chart 2*).

At the present time we are obviously in a period of depression, and the tonnage is decidedly below normal. Less fertilizer is being consumed than a projection of the long-time trend would indicate. The chief cause of this depression is the low crop values per acre, particularly of cotton.

But what of the future? Is it to be expected that consumption will stay permanently below the normal long-time trend? Our answer is, "No." It is to be expected that normal increases in population and the adjustment of crop prices to all commodity prices will cause consumption to turn upwards and ultimately exceed the tonnage indicated by a projection of the long-time trend.

An examination of this long-time trend shows that the alternating periods of depression and expansion are apparently the same (*chart 2*). Thus, there are raised two very interesting questions regarding the future—when consumption again increases will it go above the long-time trend to the same extent that it has been below? And how long will it be until the normal upward trend is again reached? Some allowance must, of course, be made for the higher con-

centration of present and future fertilizer tonnage. Whatever happens in these respects it is reasonably certain that fertilizer consumption will again turn upwards and ultimately exceed to some extent the normal trend in tonnage.

Note, for instance, the very striking changes that are taking place in crop production, particularly with vegetables. The high city wages and urban prosperity of the past few years have created a much larger demand for vegetables. In 1924, the acreage of strawberries was 42 per cent above the 1909 acreage; cabbage 33 per cent; cantaloupes and muskmelons 133 per cent; lettuce 1,179 per cent; onions 83 per cent; tomatoes 103 per cent; and watermelons 172 per cent. This phenomenal expansion in the acreage of these crops is in bold contrast to the expansion in the total crop area, which was only 9 per cent. Thus while cotton acreage is expanding in western Texas, a region in which no fertilizer is used, general economic conditions are causing changes in the food habits of American people which undoubtedly are creating a new demand for a large tonnage of commercial fertilizers. The prospects are that the acreage of fruits and vegetables will probably continue to increase and increasing quantities of fertilizers will be used for this purpose.

This is one indication of how economic conditions tend eventually to restore fertilizer consumption to the normal long-time trend, even in spite of lower cotton prices and the expansion of cotton acreage in non-fertilizer areas. Therefore, over a long-time period, as farm prices come into adjustment with other prices, as intensive crops increase in acreage, and as such acre values increase, there will be a decided tendency for fertilizer tonnage to increase until the normal trend is reached and for a time is exceeded.

This view of the long-time trend and a study of the factors that influence consumption indicate several things as being urgently necessary now. Three of them are of outstanding importance. First, there is an urgent need for equipping and adjusting physical and financial plans to a longer period of time than one season. One year as a unit of time and as a basis of planning fertilizer consumption is too short. A vast amount of damage can be done by looking only at the present, by being preoccupied solely with immediate needs, and by scattering energies which might better be conserved for the future. The long-time view-point indicates the urgency of economy and confidence—production sufficient only to meet present demands of doing business as economically as possible, and confidence that while consumption may be low at present, it will ultimately return to the normal trend and repay sacrifices made in the present depression.

The second necessity is to keep close watch on changes in crop acreage and develop the use of fertilizers by educational methods in areas and on crops, where at present sufficient fertilizer is not being used. The preceding figures tend to show that even though the cotton acreage is reduced, there are changes going on that will eventually absorb a large amount of fertilizer.

The third urgent necessity is cooperation. No individual agency can influence, except to a limited extent, the factors that at present control fertilizer consumption. Cooperation, therefore, is essential not for a season only, but on the basis of a long-time plan of well organized effort to spread the knowledge of the use of fertilizers over more crop areas, to increase

crop values per acre, and to study economic and market conditions so that production and distribution may be economically adjusted to such conditions.

Cooperation is not easy. It has its own technique which has to be learned the same as the technique of any other job, but it will have to be learned if fertilizer consumption is ever to be stabilized and if lean fertilizer years are to be eliminated.

* * *

Potash Pays

(*From page 27*)

have sufficient potash can be told by certain definite symptoms, according to soil experts. Clovers and alfalfa show it by the appearance of pin-head sized white spots along the outer edge of the older leaves. These spots later cover the leaf and it turns yellow and drops off. Potatoes, when starving for potash, have dark green leaves curled down, and seemingly thicker than normal. Grains and grasses, including timothy, develop a rusty brown color which resembles the symptoms of a crop suffering from drouth. Later the grains turn a dirty gray and rusts and mildews appear.

* * *

A popular saying of a generation or two ago was: There are four types of men: The man who doesn't know, and doesn't know that he doesn't know; he's a fool. Look out for him. The man who doesn't know and knows that he doesn't know; he's a sensible man. Give him a chance. The man who knows and doesn't know that he knows; he's asleep. Wake him up. The man who knows and knows that he knows; he's a wise man. Listen to him.

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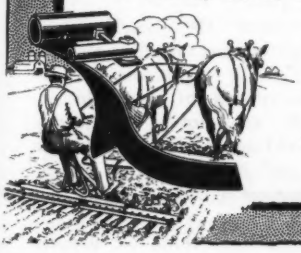

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Attention Please!

(*From page 4*)

fident voice to tell an interesting story. Soon he launches into a description of various illnesses and ailments but always he describes them in *personal* terms. He speaks of "*your* headache, *your* loss of appetite, the way *your* feet ache at night." Now he pretends to show you the cause of these symptoms, unveiling the bottles and exhibits on the table to illustrate his points. Then he recites how an Indian chief discovered a mysterious herb that cured all mankind's ills and finally how the Indian turned the secret over to him. "And now, folks, it's all here in this bottle which my assistants will distribute among you for the small sum of 50c apiece."

We have now observed three more ways of arousing interest. First—the "doctor" *gave* the crowd something before he asked anything of them. The elaborate show we enjoyed at first was not a charity offering; we were expected to pay for it by listening to the "doctor's" talk and most of us did. If he had come on at the first minus the entertainers, we might have listened to him for a moment but we would have drifted away quickly. However, under the spell of the entertainment, we remained and heard him out.

This principle of "give before you get" is an old one. I have seen it work many times in raising money or winning support for some cause by first feeding the invited group well and then asking them to pledge the money or support.

The second way the "doctor" got interest was by talking to his audience about themselves and their troubles. It was not until the very end of his talk that he even mentioned himself or his cure. Always he kept directing his words to "you" and "your pains" not to "me" and "my medicine." We are most interested in ourselves, hence we will listen more readily when some one talks about us and our problems.

The third principle illustrated by the "doctor's" talk was the value of being definite and specific. When he wanted to illustrate what he called the "causes" of rheumatism and lumbago, he unrolled a brightly colored chart showing a cross section of the human body. When he wanted to show what his medicine would do, he gave the names of townspeople whom he said it had benefited and displayed in a glass jar a tapeworm which had lately lodged in a fellow citizen's intestines. When he wanted to convince the crowd that his foot salve would work quickly, he called upon the platform one of the townsfolk who suffered most from corns and applied the remedy right on the spot so that the crowd could see the sufferer's relief.

No generalities or abstractions for the "doctor." No sir! He was out for practical results and he knew that most people only comprehend a generality when they see it embodied in a specific example.

HAS it ever occurred to you that these methods which the "doctor" was using so successfully for an unworthy purpose could be applied just as well to more useful ends?

Why must the teaching of geometry necessarily be a dull subject? Is it impossible to present the results of scientific research in any but a ponderous and plodding style? Must the quacks and fakers be left to enjoy a monopoly of attention and interest?

I am loath to think so, despite

the overwhelming evidence to the contrary. How can we account, then, for the fact that the servitors of truth have such a hard time getting any one to listen to them?

I once questioned a friend of mine, who occupied a professor's chair, on this subject. "Why," he exclaimed, "that's an old topic. I suppose one reason so many complain of our dullness is just because we are dealing with the truth. When you come down to it the truth is a pretty grim thing. It doesn't lend itself to trappings and display. Sometimes you find, especially in scientific work, that there is more than one side to the truth. You can't be direct and positive and confident the way a faker is. To present the truth you have to present all sides of the question, and that often bores people who prefer a simple half truth to a complex whole truth.

"Besides, why does the truth need all these circus trappings? If I turn handsprings or have my secretary perform the Charleston before my lecture, does that make what I say any more true? Doesn't it, rather, cheapen and degrade the truth I have to offer?

"It's as much as one man can do to discover a little bit of the truth. People ought to be grateful for that and not ask him to dress it up in pretty clothes to make it pleasanter for them to look at."

My friend's defense has many merits, I think. There is, however, a fallacy in it which carries us back to our main theme. *It is not enough to know the truth. You have got to make it prevail.*

ALL honor to the man who tracks down by patient research some new bit of truth. But let us realize that this truth will never bear fruit until some one has made it interesting to those who can use or apply it in actual life.

If truth by itself were enough, we should have abolished war long ago. But we wage wars and shall continue to wage them until, as William James pointed out, some one learns how to make peace more attractive and interesting than war.

I think we are rapidly coming to the point where we see that truth must be popularized and "put across" with the same care and skill that have been devoted to selling and advertising the more material things of life. I venture to predict that we are on the eve of a period which will be largely devoted to popularizing and humanizing the great body of scientific and cultural knowledge we have been accumulating for the past century.

In agriculture more than in any other field, this movement should work profound changes. It is only within the brief space of some twelve years that the county agent and extension system has been functioning. Yet in that period we may safely say American agriculture has advanced more rapidly than in a whole century preceding.

And we are only beginning to glimpse the possibilities of this work!

I am sure that there are times when every one engaged in battling ignorance and prejudice and laziness wonders whether it is not a hopeless cause. Well, if you persist in fighting with those old worn-out weapons of pedantry and hair-splitting and disdain, it may well be so. But, if you will arm yourself with the modern equipment provided by psychology and common sense observation, and use it rightly, you will have a good start toward victory.

UNCERTAIN RELATIONSHIP

Dennis—"An' so yer sis has a new baby? Congratulation, Uncle Pat."

Patrick—"Uncle? Faith an' Oi' haven't heard yet whether it's a bhy or a gurrel so Oi don't know whither Oi'm an uncle or aunt."—*Florida Grower.*

Prof.—Is this wrong? "I have et."

Stude—Yes.

Prof.—What's wrong with it?

Stude—You ain't et yet.

WISE BOY

Mother: "If you wanted to go fishing why didn't you come and ask me first?"

Johnny: "Because I wanted to go fishing."—*Chicago Tribune.*

Tourist: "Brother, how far is it to the next garage?"

Native—(After some feverish gestures): "G-g-g-go on, y-y-you'll g-git there f-f-fore I kin t-tell ye."—*Farm Life.*

SELECTIVE THERAPY

"Well, here you are," said the doctor, "a pill for the kidneys, a tablet for the indigestion, and another pill for the nerves."

"But, look here, doctor," said the patient, "how will the little beggars know where to go when they're inside?"

WRONG PLACE

A Chicago man died and passed into the great beyond. A guide showed him about, but after an hour of wandering the Chicago man said contemptuously:

"Well, I've heard heaven cracked up a whole lot, but I'm telling you it ain't a darn bit different from Chicago."

"Heaven!" exclaimed the guide. "This isn't heaven."—*Finance and Industry.*

Husband (driving his car past farmer's span of mules which happened to bray at that moment): "Relatives of yours, I suppose."

Wife (smiling sweetly): "Yes, by marriage."—*Brooklyn Life.*

TO HAVE AND TO HOLD

Customer—"I want some underwear."

Clerk—"How long?"

Customer—"Dern ye, I want to keep it."

Mother—"And what did you learn in school today, dear?"

Ruthie—"Oh, mother, I don't have to educate you all over again, do I?"

A SLIGHT PRECAUTION

Son—"Can you sign your name with your eyes shut, daddy?"

Father—"Certainly!"

Son—"Well, shut your eyes and sign my school report."

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When yields per acre are increased, the cost per bushel drops. Progressive growers, therefore, study how to increase acre yields at smallest costs.

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For example, in Rhode Island official tests, a complete fertilizer containing 150 lbs. of actual potash has given 90 bushels more potatoes per acre than where only 50 lbs. of potash were used in the fertilizer. *In this instance, every dollar spent for potash gave an increase of 16 bushels of potatoes.*

This shows how much difference the *amount* of plant food you apply per acre can make in your final profits.

See that your potato crop receives from 80 to 150 lbs. of actual potash per acre this year. An application of 800 to 1,500 lbs. per acre of a high analysis fertilizer, containing 10% potash—1,000 to 1,875 lbs. per acre of an 8% potash mixture —or 1,600 to 3,000 lbs. per acre of a 5% potash mixture will supply these amounts of actual potash.

Many growers prefer sulfate of potash in their fertilizer because they find it gives mealier, better quality potatoes. If you are after better quality, specify *sulfate of potash* in your mixture.

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